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The I.M.E.A. Convention.

THIS year's Convention well maintains the standard set in previous years in being productive of some useful and carefully thought out papers The most striking feature of the President's address was his advocacy of regional control of distribution networks, analogous to the control of generation and high-voltage transmission by the Central Electricity Board. Mr. Nichols Moore cites the interesting attempt that has been made to overcome the faults inherent in both municipal and company control in Berlin and the surrounding country. The system of supplying electricity by means of State- and municipally-financed companies with a view to combining low capital charges with flexibility of operation has been in vogue elsewhere in Germany for a number of years. It was the subject before the late war of a comprehensive British Consular Report, of which too little notice was taken at the time. But however desirable it may be to free the electricity supply industry from the domination of local politics on the one hand, and of short-sighted financial considerations on the other, and at the same time to standardise distribution voltages and to give supplies in the commercially unattractive areas, we see far greater difficulties in framing the legislation Mr. Nichols Moore calls for than in that required for the interconnection of power stations.

Mr. Nichols Moore, it seems to us, is either too early or too late. Too early, because the industry requires a long breathing space before further legislation is attempted; too late, because almost the whole of rural England has now been parcelled out among statutory companies, each of which distributes, or will distribute, in an area quite as large, presumably, as the area Mr. Nichols Moore has in mind.

Of the papers read and discussed at the Convention, only one deals with a purely technical subject. The others relate rather to managerial and administrative functions, as might be expected from the composition of the Association. They deal with "Whitleyism," legal cases and problems, and tariffs, all matters of immediate moment. They are all by laymen. The first two are by recognised authorities on the subjects they chose to speak on. The paper on tariffs shows the clear grasp of the fundamental requisites of tariff-making,

which one would rather expect to find in an engineer of specialised experience. These fundamentals are (1) the recognition of the importance of commercial expediency, and (2) the correct allocation of costs to fixed and running charges. We recollect publishing an article on the first aspect as long ago as 1909 ("Equity *versus* Expediency," by Mr. E. E. Sharp, April 23rd, 1909, p. 698). Load factor has an important bearing on the relationship between fixed and running charges. This was clearly shown in another article which appeared more recently in these columns ("Generating Station Costs," January 28th, 1927, p. 124, by Mr. R. O. Kapp).

U-V Rays in Rubber Manufacture.

CONSIDERABLE developments have been made recently in the application of ultra-violet radiation to the rubber industry, and the method has now become a recognised part of manufacturing technique. The radiation is mainly obtained by the use of the quartz mercury-vapour lamp as supplied by several British manufacturers.

The two main applications of this instrument in the rubber industry are, primarily, for the identification of materials by means of the characteristically-coloured fluorescence which is exhibited when various substances are examined under ultra-violet radiation, and, secondly, the application of the rapid photo-chemical reactions induced by exposure to this source of light.

A considerable amount of work has been done recently in the first application of this method, and some very successful results have been made possible. Special advantage is taken of the fact that many mineral substances continue to exhibit characteristic colours when mixed with rubber, both in the vulcanised and unvulcanised states. Materials, such as zinc oxide, can often be classified according to the source of supply by examination under a mercury-vapour lamp, and the presence, or absence, of a large number of powders and drugs in rubber mixers can be detected by this means. There is wide scope for more intensive investigation into the possibilities of this method, and from the results obtained already it would appear to be one which may well become of much practical importance in the future development of the rubber industry.

The photo-chemical reactions induced by exposure to ultra-violet light include the fading of organic dyestuffs, the darkening of certain white pigments, and the rapid oxidation of rubber, which is often revealed by the appearance of large numbers of minute cracks on the surface of the sample. Technically, much advantage is gained from the rapidity with which these reactions take place, and the use of ultra-violet radiation enables some processes to be accelerated.

The "fastness," or colour stability in sunlight, of dyestuffs used in the proofing trade is, of course, a matter of great importance. Apparatus known as the "Fadeometer," which consists essentially of a mercury-vapour lamp in a suitable housing, is in common use. Rapidity of action is, again, the great advantage, and the effects of strong sunlight, approximating to many days, can be observed in a short time under the greater intensity of the rays generated by mercury-vapour lamps. In the same way, exposure tests are carried out to determine the resistance to sun-darkening of white rubbers loaded with such pigments as lithopone.

In the tire industry resistance to sun-cracking is of considerable importance, and accelerated ageing tests involving the use of ultra-violet radiation are carried out in the laboratory to determine the relative values of various rubber compounds so far as this particular property is concerned. The establishment of many new tire factories in this country comparatively recently has brought this method into prominence, for competitive reasons have demanded the careful investigation of every possible scientific method to improve, either the product, or the process, of manufacture.

Both in applying the photo-chemical effects and in the identification of materials there is scope for much further development, and it is probable that the use of ultra-violet radiation will ultimately become an important factor in many technical processes of the industry.

Birthday Honours.

FOREMOST, and deservedly so, in the King's Birthday Honours list, appears the name of Sir Arthur Balfour, K.B.E., J.P., who has been made a baronet, in recognition of the splendid devotion that he gave as chairman of the Committee on Industry and Trade for a period of 4½ years. Mr. Benjamin Dawson, who also receives a baronetcy, is chairman of the Bradford Conservative Association and the proprietor of the Bentham Power Supply Company. Knighthoods are conferred upon: Prof. H. C. H. Carpenter, M.A., F.R.S., Professor of Metallurgy in the Royal School of Mines; Mr. J. Plowright Houfton, who is on the boards of the Mansfield District Tramways and the Mansfield District Light Railway Co.; Mr. R. T. Nugent, Director of the Federation of British Industries; and Mr. W. S. Jarratt, Comptroller-General of the Patent Office. A C.B.E. in the Military Division is given to Capt. R. A. H. Lewin (late Royal Engineers, Instructor School of Electric Lighting, Gosport). Sir A. M. Duckham, K.C.B., M.Inst.C.E., M.I.M.E., chairman of the Economic Mission to Australia, receives the award of G.B.E. in the Civil Division; Mr. A. D. Erskine, Officer for Light Railway Work, Ministry of Transport, becomes an O.B.E. (Civil Division), and Mr. W. L. Buxton, lately Assistant Secretary to the Committee on Industry and Trade, receives the M.B.E.

Advertising the Register.

ONE of the principal criticisms to which the National Register of Electrical Installation Contractors has been subjected in the past is that its light has been hidden under a bushel. This can no longer be charged against it, for during the past year a great deal has been done in the way of bringing the Register's aims before those principally interested in sound wiring installations. Advertisements have appeared regularly in a number of electrical, municipal, architectural and building journals; a pamphlet entitled "Hidden Risks," condemning shoddy wiring, has been widely circulated; local lists of registered contractors have been prepared and distributed; and in a number of other ways the Register has received the publicity to which it is justly entitled.

To ensure the continuance of this publicity the revenue (which is very small per contractor) must be maintained, and it is incumbent upon the registered to induce eligible contractors in their districts to become enrolled, and upon municipal authorities, architects, builders and others having the placing of electrical work to see that only qualified contractors are employed.

The Position of French Engineering.

YESTERDAY, June 6th, the E.H.P. Conference opened its proceedings in Paris, and from June 11th to 22nd the summer meeting of the Institution of Electrical Engineers will be educating many members with particulars of the more interesting French works and plant. During the past few months we have given in these leaderette pages a number of authoritative comments regarding the industrial and engineering position in France and to-day we may touch upon such matters again.

If it were based on anything like sound foundations, a striking example of the topsy turvydom which exists generally in relation to Great Britain and France would be furnished by the argument so often advanced in France that the cause of French industries being backward, as compared with the activity of agriculture, is the insufficiency of professional engineers. It is perfectly true that there is an insufficiency of competent industrial labour, but that is quite another matter. What it is probably intended to convey is

that there is an insufficiency of *creative engineers*, and that what is lacking in France is not quantity, but quality. In perfect justice it must be admitted that in this respect France is not alone; nevertheless, no matter what affection one may have for France, and in spite of all due appreciation of what she has accomplished in science, anyone who knows the two countries must recognise the utter fallacy of the statement so frequently made, even in England, that the standard of French education is superior to ours.

Why did the water power of the Pyrenées and the Alps, now being developed, have to wait for the 1914-18 European war before any important attempt was made to utilise it? Engineers in France, duly in possession of diplomas, may be had to-day in hundreds, and perhaps thousands, but in the present state of French industry there is very little demand for mediocrity.

France being primarily an agricultural country, with abundant resources in water power which are being gradually absorbed for the generation of electricity, it is not surprising that an important increase should be noticeable in the employment of electricity for agricultural purposes and in rural districts generally. One of the uses which promises to develop to a very important extent so soon as the conservatism of the peasant can be overcome, and will cause a large amount of electric power to be consumed, is the operation of ploughs by electric power; recently, particularly in the departments of Oise, Seine et Oise, and Eure et Loire, applications have been made under practical conditions. Apart from the convenience which is afforded by electricity in being always ready, the great advantage to the agriculturer in France is the economy which it effects in labour, for in certain parts of the country agricultural labour is both scarce and expensive, while the possibility of reducing the number of oxen maintained solely for traction is also an important consideration. On the other side of the account is the heavy initial expense of the installation, which makes landowners hesitate to adopt a system which is quite new to them. However, it is much more easy to converse with farmers on the subject now; they are ready to listen and to learn, and there is no doubt that with the next generation with its inevitable development in the use of electricity generally, progress is assured in the employment of electric power for agricultural purposes in France.

Magnetic and Non-Magnetic Alloys.

METALLURGICAL science has been influenced to a greater extent than is commonly appreciated by the requirements of electrical engineers. We have recently had our attention drawn to several new magnetic alloys, but equally as important in practice are non-magnetic metals. The fundamental objection to cast iron for many purposes was, until recently, that it was magnetic to a greater extent than any other metal, but this feature has now been overcome and non-magnetic cast iron has become a competitor of brass, aluminium, and other non-magnetic materials.

The condition of the carbon compounds in cast iron is largely responsible for the change of properties that may be brought about in the metal, either electrically or magnetically. The various allotropic forms of iron also have differing magnetic and electrical properties. It is claimed that non-magnetic cast iron, with its unity permeability and high resistance, has a combination of properties which is not possessed by any other material, or metal, and is thus useful in the manufacture of many electrical components, such as insulator carriers and holders, switch covers, &c. The electrical engineer knows of many purposes for which non-magnetic cast iron is of great value, and he recognises the value of the work of the British Cast Iron Research Association and of private research workers. If the metallurgist has come to the aid of the electrical engineer, on the one hand, the electrical engineer has, on the other, very greatly assisted the metallurgist by the development of the electric furnace as a melting unit.

It is important, indeed essential, that the electrical engineer should know almost exactly what are the magnetic and electrical properties of metal. Alloys that have specified magnetic, or electrical, properties are usually of a proprietary kind. The electrical engineer has not always a foundry, however, and may have to depend on a jobbing foundry to supply him, when castings are required, with metal of a specified composition. A foundry is more likely to do so if it is assured of a regular demand. In fairness to jobbing foundries, it should be remembered that it is not practicable to melt different mixtures for all their customers. Apart from castings, an alloy can now be obtained that is particularly suitable for the cores of audio-frequency transformers. Then, with the development of electric resistance furnaces, came a demand for alloys with pronounced heat-resisting properties; alloys of nickel and chromium are largely employed, the chromium content being about 20 per cent., and such alloys ought to be commercially free from iron, carbon, manganese, silicon, and aluminium. Such alloys have a very high resistance to heat. Another magnetic alloy has an initial permeability of the order of 7,000 to 10,000 with very low hysteresis losses, the latter being about one tenth of those of the best Swedish charcoal iron. Some of these special magnetic alloys require heat treatment in order to develop their properties fully. Progress with regard to special magnetic alloys is due to the combined efforts of engineer and metallurgist.

Flat-rate Tariff in Norway.

As Norway is endowed with plenty of water power and has but little coal, it is only natural that advantage has been taken of the former for the purpose of producing electricity instead of having to import coal. On the basis of six large works in that country Mr. Norberg Schulz, of Oslo, has investigated the subject of how far the sale price of energy generated with the aid of water power and used to supply towns can compete with that of energy furnished by modern steam power stations. In Norway, he states ("E.T.Z."), electricity is almost exclusively produced from water power. At the end of 1927 the plant installed represented 1,579,086 kW of generator capacity, steam power having only a small share of the total.

As there is much water power in Norway and but little coal is available, it is quite out of the question to consider the subject of competition in the same way as in countries having abundant supplies of coal and oil. The author says that if the annual load factor of the Norwegian works has reached a level that is considerably above the figure elsewhere recorded, it is due substantially to the very extensive use of flat rates (bulk tariff) for charging for energy. Almost everywhere domestic requirements are delivered at a flat rate, and that method is gradually becoming the greatest market for Norwegian works. At present it may be reckoned that about 70 per cent. of the supply of energy is used for domestic purposes, if the large industrial works are left out of consideration. Under the flat rate tariff the consumers pay a fixed annual price per kilowatt, which is determined by current limiters, and energy for lighting, cooking, heating, &c., is used as consumers please. In this way a high annual load factor and a correspondingly low price per kilowatt-hour supplied are obtained. It is considered that the rapid extension of the use of electricity in dwellings must in the first place be ascribed to the flat rate, as both the consumers and the suppliers know exactly what they will have to pay and receive, respectively. The supply of electricity takes place everywhere with the object of obtaining the greatest possible extension of the use of electrical energy and the flat-rate-tariff policy seeks to keep the price as low as possible consistent with commercial remunerativeness. The results quoted by the author show that the flat-rate-tariff fulfils the purpose in this respect, because it would probably only in this way be possible to offer cheap prices simultaneously with the necessity of maintaining a high annual load factor.

Electric Power in Tweed Mills.

Two interesting Scottish border installations, one of which is steam-electric and the other hydro-electric, aided by a pump-filled water-storage reservoir.

MESSRS. Henry Ballantyne & Sons, Ltd., of Walkerburn and Innerleithen, Peeblesshire, enjoy a long-established reputation as manufacturers of Scotch tweeds. The firm's success in the home and overseas markets alike is largely due to the persistent employment of the best raw materials, worked on modern machinery by skilled workers, and is further contributed to in no small measure by the adoption of the electric drive, first in the Tweedvale and Tweedholme mills at Walkerburn, and later in the Leithen mill at Innerleithen, the latter installation having been decided upon as a direct result of the economies and improvement in the quality of the products effected at the Walkerburn mills. From the following brief description of the power plant installed at the mills it will be appreciated that the installations offer evidence of the economies made possible by substituting the efficient, reliable, and convenient electric drive for the old methods.

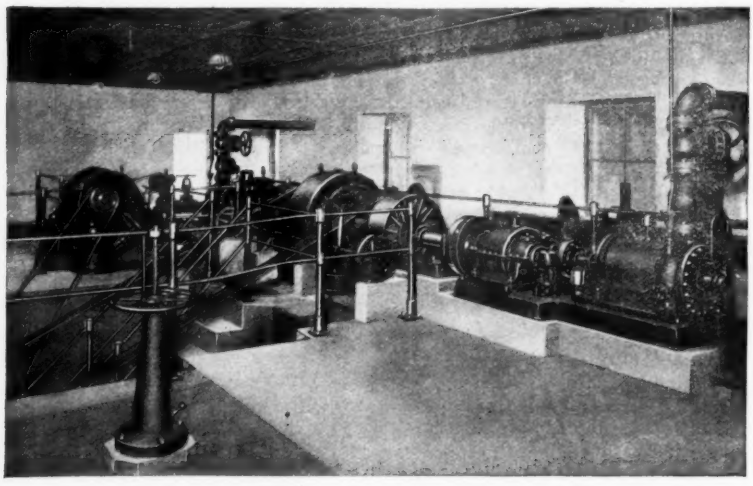


Fig. 1.—Interior of Walkerburn Mills Power House.

The two mills at Walkerburn obtain their power from a hydro-electric plant installed in a central power house. This plant has several noteworthy features, which make the scheme one of special interest to power engineers and to those who may be contemplating the utilisation of any available water-power.

Formerly the Walkerburn mills were each driven by a pair of breast wheels operated by the mill lade from the River Tweed, one pair on a fall of 5 ft. 4 in. and the other on a fall of 4 ft. 10½ in. The water-wheels between them developed approximately 110 horse-power, and as the mills were extended the additional power required was met by the installation of steam and gas engines. After considering the inefficient nature of the existing power plant and comparing it with the advantages accruing from the electric drive, it was decided to demolish the old plant and install in its place hydro-electric plant of such capacity as would meet future extensions to the mills.

The total power required is 300 kW, and as 145 kW is the maximum which can be obtained from the mill lade, and that only by uniting the two falls and deepening the channel between them, a scheme was evolved whereby the additional 155 kW has been obtained from a reservoir constructed on the top of a near-by hill, which is filled with water during the hours when the mills are standing. The contract for the complete installation was carried out by Boving and Co., Ltd., London, the two dynamos being supplied by Bruce Peebles and Co., Ltd., Edinburgh. The power house contains a Boving high-pressure water turbine directly coupled to a Peebles 155-kW, 250-volt, 1,000-r.p.m. open-type dynamo, two Boving low-pressure water turbines driving a Peebles 145-kW, 250-volt, 600-r.p.m. open-type dynamo, and two Boving 400-g.p.m. centrifugal pumps. This dynamo is situated between the two pumps and is driven by belts from the two low-pressure turbines. The pump pulleys are in alignment with, and alongside, the dynamo pulleys, and when the mills close down each night the belts are shifted to the pump pulleys. The capacity of the pumps is such that they lift sufficient water to the reservoir during the idle hours of the mills to supply the high-pressure turbine driving the 155-kW dynamo during working hours.

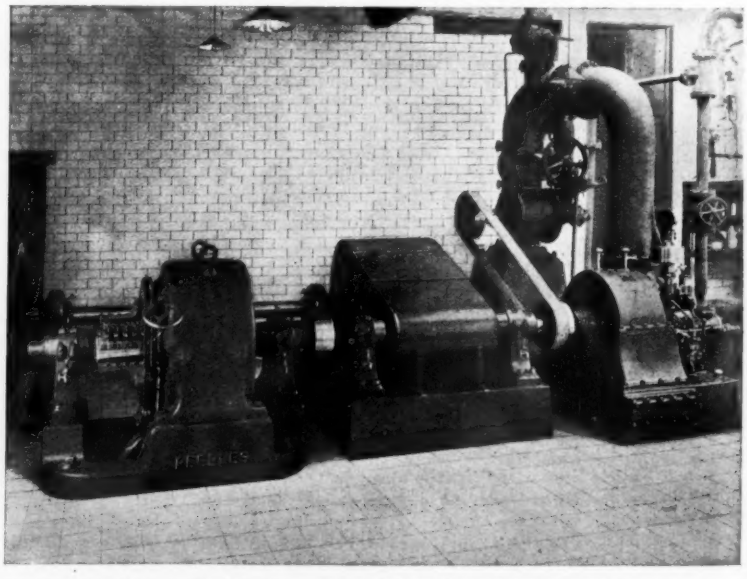


Fig. 2.—Turbo-generating Set at Innerleithen Mills.

Fig. 1 shows the interior of the power house with the belt drives from the low-pressure turbines to the dynamo and pumps in the middle foreground, and the high-pressure directly-coupled set in the background.

From the foregoing description it will be seen that when the mills are at rest, power equivalent to 220 horse-power, instead of running to waste, is utilised to pump water into the reservoir already mentioned. The reservoir, which is constructed of ferro-concrete, is 1,000 ft. above the power house and has a capacity of 3½ million gallons of water.

The electricity supply to the various motors installed throughout the mills is controlled by a switch panel located in the power house.

Innerleithen is situated about four miles west of Walkerburn and is on the River Leithen, just above its entrance into the River Tweed. The Leithen mill, unlike those at Walkerburn, was originally driven by a Petrie 120 horse-power, 75-r.p.m., steam engine. When the firm decided to reorganise the power plant several schemes were considered and, as efficient boiler plant existed and steam was required for process work, it was decided that a steam turbo-generating set would give the most economical results. Mitchell Graham & Son, Ltd., agents for Messrs. Bruce Peebles & Co., Ltd., laid out a scheme which had for its object the temporary retention of the existing main rope drive to the mill, and at the same time the provision of a dynamo large enough to meet present and future requirements. By this means the electrification could be carried out step by step while the work of the mill proceeded in the usual manner. The scheme was adopted and the whole of the installation work, including the demolition of the existing steam engine, was carried out under the direction of Mitchell Graham & Son, Ltd. It is interesting to note that the new plant was installed without any interruption in the working time of the mill, and to enable that to be done the turbo-generating set was installed while the old engine was still in use. Owing to restricted space, the connecting shaft between the turbine and existing mill drive could not be laid until after the removal of the engine. A week-end was sufficient in which to dismantle the engine and install the new drive, notwithstanding the large and heavy parts which had to be handled.

The new plant, which is shown in fig. 2, consists of a "Carmac" 220-h.p., 12,000-r.p.m., steam turbine driving through gears a Peebles 120-kW, 250-volt, 1,200-r.p.m. open-type dynamo, and also the main mill shaft which runs at 216 r.p.m. and is driven by four Hans Renold chains from the 1,200-r.p.m. shaft. When the mill has been completely electrified this shaft and the rope drive will be discarded, and all the power required will then be supplied by the dynamo.

It is noteworthy that with the 220-h.p. steam turbine the coal consumption is less than was used by the 120-h.p. engine, the efficiency of the turbine being about 12 lb. of steam per b.h.p., as against 25 lb. in the case of the engine.

The lighting of the mill has been very efficiently carried out and it has been said that it is superior to any mill-lighting system used on the Scottish border.

The advantages resulting from electrification are now generally realised, and they may be assumed to include economy and reliability, simplicity of control, cleanliness, adaptability, elimination or reduction to a minimum of shafting and belts, improvement in the quality of the product, due to the steady drive, and the facility of checking the power consumption of any particular machine, or line of machines. These benefits, coupled with safety, an important factor where female labour is employed, result in increased production.

We are indebted to Mr. Ewan, chief engineer to Messrs. Henry Ballantyne & Sons, Ltd., for assistance in the preparation of this article, and also for the accompanying illustrations.

Potentiometer Regulators.

Notes relative to a method of varying and reversing the field current of the special generators employed for the control of motors on the Ward-Leonard system.

By CLAUDE W. HILL, M.Inst.C.E., M.I.E.E, M.I.Min.E.

THE use of the Ward-Leonard system of controlling the electrical operation of opening span bridges necessitated the evolution of new designs of potentiometer regulators for the purpose referred to.

Each of the designs outlined below is capable of reducing the field current of the special generators utilised to zero and reversing it without breaking the circuit. Figs 3*a*, *b*, and *c* show a very simple form of potentiometer regulator, the arrows on the three diagrams showing the directions of the current in each case. It will be noted that in this design, when the switch lever is full on, one half of the resistance remains in series with the field coil. Consequently the total wattage, field coil plus potentiometer, is greater than it would be if the resistance were all in parallel with the field coil when the switch is in this position. This point is dealt with again later.

Figs. 5*a*, *b*, and *c* illustrate a development of the previous design, in which two levers are used, geared to move in opposite directions. In this case, when the switch is full on, the whole of the resistance is in parallel with the field coil, so that the latter receives the full voltage of the circuit. Obviously, if the motor is to run for long periods at full speed it might be worth while to provide a subsidiary switch which would cut out the resistance when the potentiometer switch was on the last step, bringing it in again when

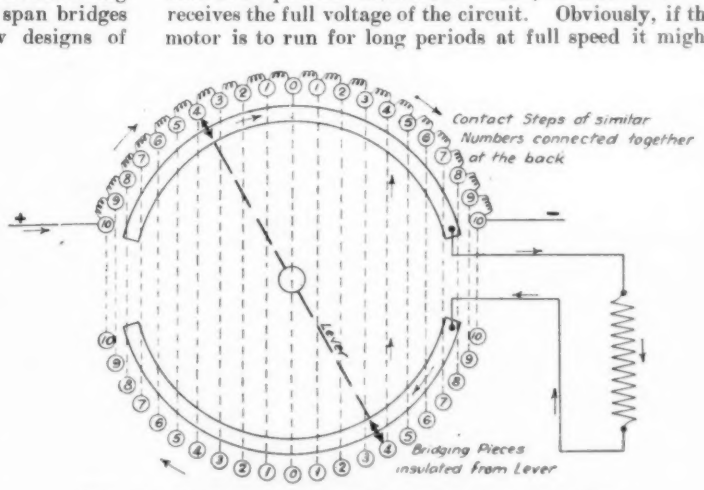


Fig. 1.—Single-lever Apparatus; Two-lever Principle.

it was moved back to the last step but one. This, however, is a comparatively small detail. It is not actually necessary to use two levers as shown diagrammatically in fig. 5, as the same effect may be obtained with a single lever arranged as shown in fig. 1, while if a greater number of running steps are required the design shown in fig. 2 may be employed.

Referring to fig. 4, the symbols are as follows:—V = circuit voltage; V_1 = voltage on field coil; C_1 = current in parallel with the field coil; C_2 = total current, potentiometer plus field coil; C_3 = current in field coil; R = resistance of potentiometer; R_1 = resistance in parallel with field coil; R_2 = resistance of field coil; and W = total wattage, potentiometer plus field coil. The equations of the potentiometer with the lever on any given step are then as follows:—

$$C_3 = \frac{V}{R\left(1 + \frac{R_2}{R_1}\right) - R_1} \quad \ldots \quad (1)$$

$$C_1 = \frac{C_3 R_2}{R_1} = \frac{V_1}{R_1} \quad \ldots \quad \ldots \quad (2)$$

$$C_2 = C_1 + C_3 \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

$$R_1^2 + \left(\frac{V}{C_3} - R\right) R_1 - R R_2 = 0 \quad (4)$$

$$W = C_3^2 R_2 + C_1^2 R_1 + C_3^2 (R - R_1) \quad (5)$$

The value to be taken for R is rather a matter of choice, the author's preference being for a value which makes the current in the resistance about one-fifth of the field current when the switch is full on. The value which R_1 requires to have on each of the running steps may be calculated from equation (4), but it is a long process. A more convenient method is to calculate a series of curves from equations (1), (2) and (3), in which the values of R are abscissæ and the currents are ordinates; an example is given in fig. 6. It will be noted that the curve C_2 has a reversed curvature, the point of inflection being at A. It is not necessary to calculate a point for each running step, for it is sufficient to calculate, say, four points at the commencement of the curve, the inflection point, and about five points equally spaced between the latter and the end of the curve. The determination of the exact position of the inflection point requires double differentiation of equation (1), thus—

$$dc_1 = \frac{V\left(\frac{R R_2}{R_1^2} + 1\right)}{\left\{R\left(1 + \frac{R_2}{R_1}\right) - R_1\right\}^2} \quad \ldots \quad \ldots \quad (6)$$

$$dc_2 = \frac{2V\left(\frac{R R_2}{R_1^2} + 1\right)^2}{\left\{R\left(1 + \frac{R_2}{R_1}\right) - R_1\right\}^3} - \frac{2 V R R_2}{R_1^3 \left\{R\left(1 + \frac{R_2}{R_1}\right) - R_1\right\}^2} \quad (7)$$

The exact position may be determined from equation (7) by finding the value of R_1 when $dc_2 = 0$. This is, however, a long process, and the position may be found with sufficient accuracy for practical purposes by calculating a few values of dc_1 and plotting them. The lowest point on the curve so found corresponds with the position of the point of inflection. Thus the curve dc_1 in fig. 6 gives values of dc_1, and its lowest point (at which $dc_2 = 0$) shows that the inflection point occurs when $R_1 =$ 29.5 ohms. As an illustration, curve dc_2 has been plotted, and it will be seen that the zero point of this curve also agrees with the same value of R_1.

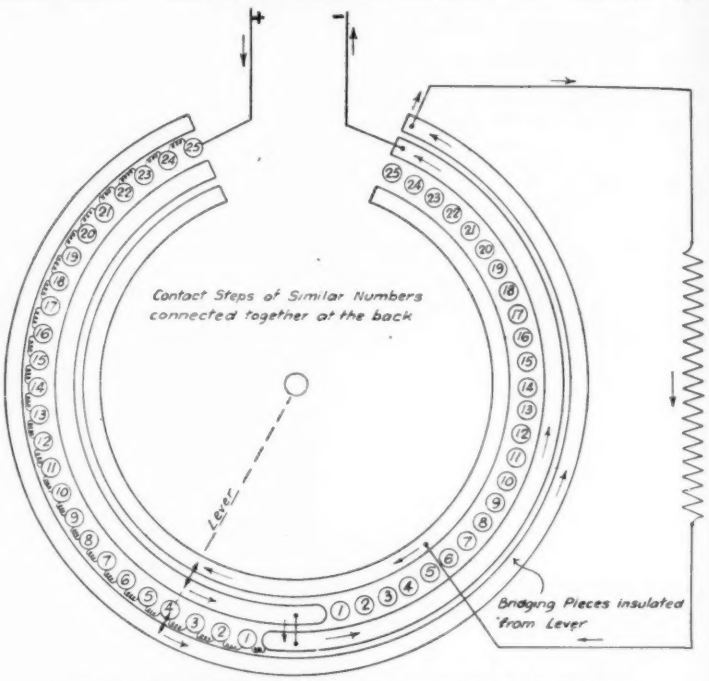


Fig. 2.—Potentiometer for Large Opening-Span Bridges.

The steps to be taken in designing a potentiometer are, briefly, as follows:—

1. Decide on the motor speed required on each running step.
2. Determine the voltages required to give those speeds.
3. From the induction curve of the special generator find the values of C_3 corresponding to those voltages.

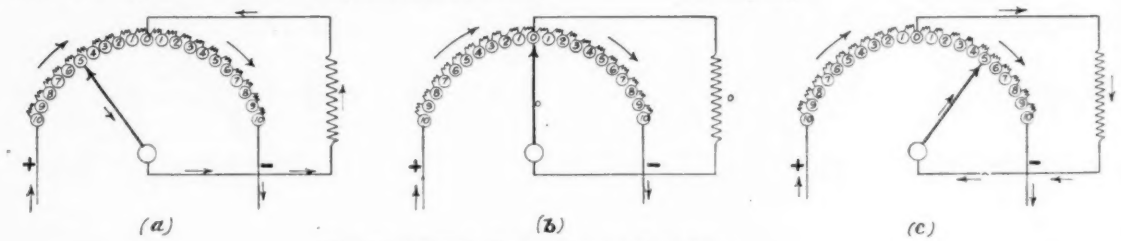


Fig. 3.—Simple Potentiometer Regulator.

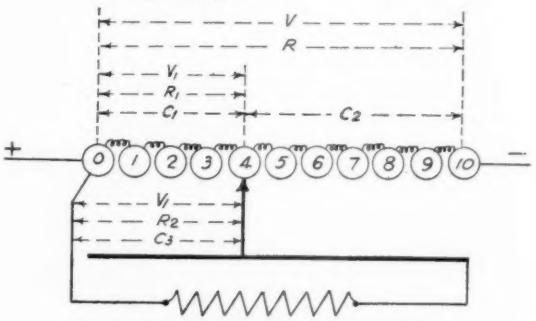


Fig. 4.—Explanation of Symbols.

4. Calculate curves C_1, C_2 and C_3, as in fig. 6.
5. From curve C_3 read off the values of R_1 corresponding to the required values of C_3.

6. From curve C_2 read off the amounts of current in the potentiometer resistance for each running step and settle the sizes of wire accordingly.

Reverting to the design shown in fig. 3, it has already been mentioned that in that case one half of the potentiometer resistance remains in series with the field coil when the switch is full on. Consequently the total wattage, potentiometer plus field, is greater than in the other designs shown, so rendering that design only suitable for small sets, or sets that work infrequently. A further point is that the value of R is not a mere matter of choice, there being in each case a definite value which gives minimum wattage. The correct value of R may be found by differentiating the wattage equation (5), and equating to zero in the usual manner for the determination of minima. For this purpose equation (5) may be put into a slightly different form: with the switch full on $R_1 = 0.5\ R$ and $R = (2V - 4\ V_1)/C_3$ (8).

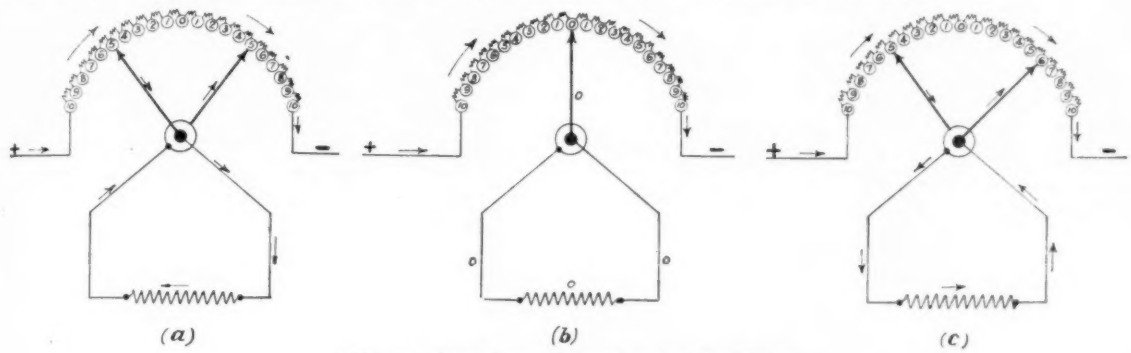


Fig. 5.—Two-lever Potentiometer Regulator.

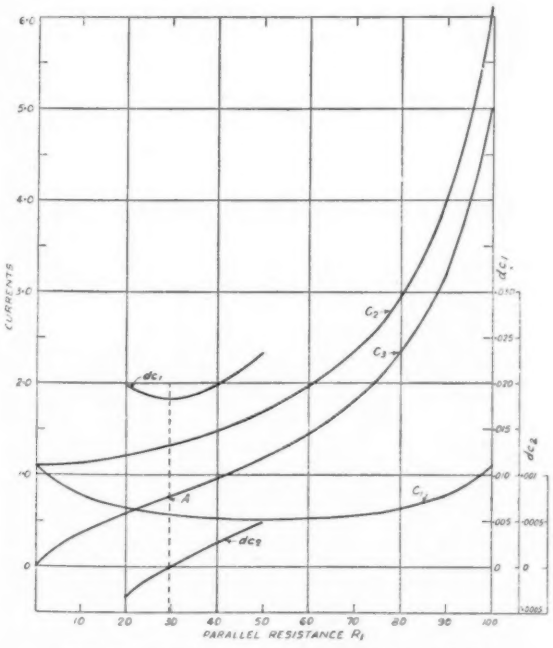


Fig. 6.—Resistance-current Characteristics.

Taking these into consideration the equation becomes

$$W = \frac{V_1^2}{R_2} + \frac{C_3\{V_1^2 + (V - V_1)^2\}}{V - 2\ V_1} \quad \ldots \quad (9)$$

Differentiation of this gives

$$dc = C_3\left(1 - \frac{2\ V_1^2}{(V - 2\ V_1)^2}\right) \quad \ldots \quad (10)$$

Equating this to zero, $V^2 - 4\ VV_1 + 2\ V_1^2 = 0$ (11) and the solution is $V = (2 + \sqrt{2})V_1 = 3.414\ V_1$ (12). As $V_1 = C_2R_2$, and as, for minimum wattage, $V = (2 + \sqrt{2})\ V_1$, the correct value of R may be found by substituting these in equation (8) thus—

$$R = \frac{2 \times (2 + \sqrt{2})\ C_3R_2 - 4\ C_3R_2}{C_3} = (2 \times \sqrt{2})\ R_2 = 2{\cdot}828\ R_2 \quad \ldots \quad \ldots \quad \ldots \quad (13)$$

The process of determining R is then as follows:—

1. From equation (12) calculate the value of V_1 to give minimum wattage on the circuit voltage V; that is, $V_1 = V/3.414$.
2. Determine the ampere-turns required in the generator field and calculate the diameter of wire which will give them with voltage V_1; then calculate the values of C_3 and R_2 which will give the correct rise of temperature in the field coil.
3. From the value of R_2 so found calculate the value of R from equation (13).

Fig. 7 is an example of the wattage and resistance curves at different circuit voltages of a potentiometer for which the field circuit data are: voltage on field

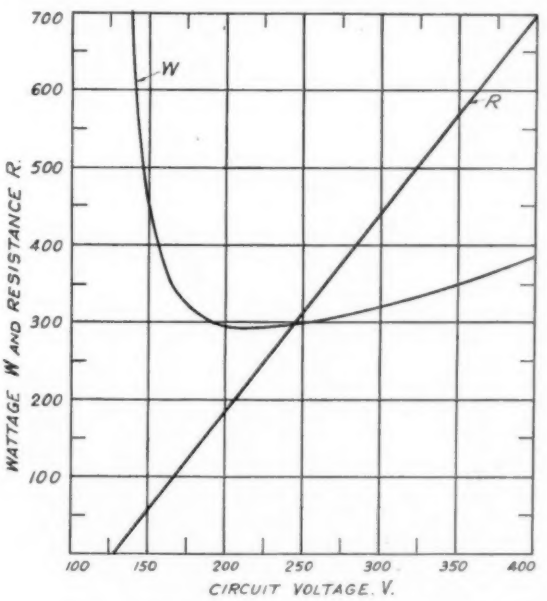


Fig. 7.—Wattage- and Resistance-voltage Characteristics.

64.4 volts; resistance of field 83.0 ohms, and field current 0.776 ampere. It will be noted that for minimum wattage the circuit voltage is 220 ($=3.414\ V_1$) and the potentiometer resistance 235 ohms ($=2.828\ R_2$).

For Ward-Leonard sets of 100 h.p. and over for the operation of large opening span bridges, &c., the design shown in fig. 2 is being used. For smaller sets the design shown in fig. 1 is suitable, while for cases in which a wide range of speed is required with very small power, as in the feed motions of some classes of machine tools, the design shown in fig. 3 may be used.

Pulverised-coal Firing.

The modern "Atritor" coal-drying-pulverising and firing machine produced by Messrs. Alfred Herbert, Ltd., working in conjunction with the Riley flare-type burner, is claimed to meet fully the requirements for pulverised-fuel firing in electricity generating stations.

THERE is likely to be for many years hence much controversy between the respective advocates of stoker firing and pulverised-fuel firing for steam raising in electricity generating stations, but whatever the outcome great importance is now attached to the use of powdered coal, both abroad and in this country, and the attention of the electricity supply industry at home has been directed particularly to the subject in recent years, because of the pulverised-fuel-firing plant that is being, and has been, installed at several large and modern power stations, including the new Hams Hall station of the City of Birmingham Electric Supply Department.

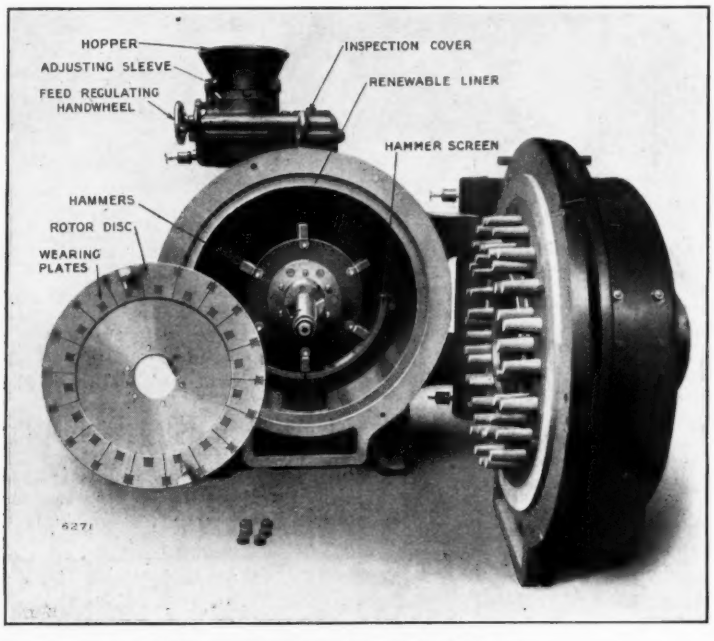


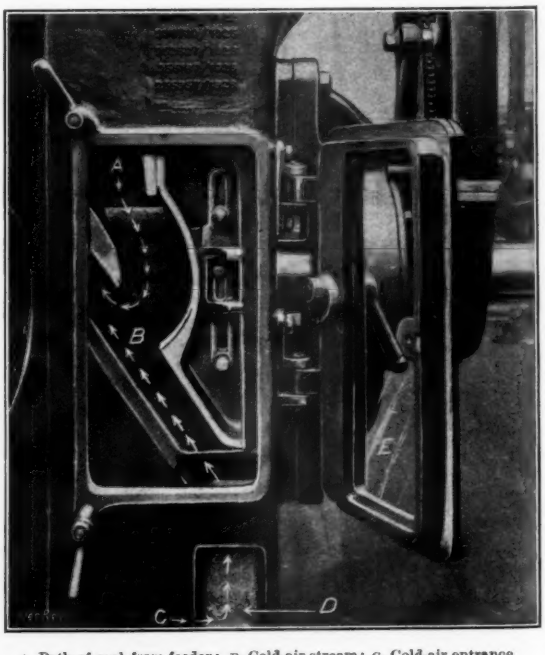
Fig. 1.—Construction of "Atritor."

While the main principles of coal pulverisation may be generally accepted, it cannot be said that electricity supply engineers have wholly, or nearly so, acceded to the claims put forward for the two main systems of powdered-fuel firing, the bin-and-feeder and the unit systems, or for the various makes and methods of the pulverising equipment on the market. It does seem, however, at this stage, that the unit system is fast winning favour, both in this and other countries, at any rate, for industrial plant. Certainly much is to be said for the elimination of driers, elevators, storage bins, and so on, in power stations.

Another point which has proved to turn the scales against pulverised-fuel firing in many cases is the maintenance costs for the mills, and with this is coupled the somewhat conflicting question of low-speed *versus* medium- or high-speed grinders. The "steam roller" principle employed in most of the low-speed mills seems to be ruled out for large power stations as cumbersome and inflexible.

We were recently afforded the opportunity, by the courtesy of Messrs. Alfred Herbert, Ltd., to inspect some installations employing "Atritors," the coal-drying-pulverising and firing machines made by that firm, and also the construction of the "Atritor" in the Alfred Herbert works. This machine is essentially of the unit system type, embodying in one housing all the essential operations of pulverised-fuel firing, and is of the high-speed type employing the principle of attrition, or rubbing, as against that of rolling or crushing. Some of the claims made for the "Atritor" are that: being self-contained, no auxiliary plant is required beyond that necessary for conveying and bunking the raw coal; as the coal drying is performed within the machine, there is no loss of volatiles; no magnetic screens are required for the elimination of tramp iron, a metal separator being incorporated in the machine to reject any material having a higher specific gravity than that of coal; the total amount of coal in circulation inside the machine at any instant does not exceed a few pounds; the apparatus is noiseless and dustless in operation; it occupies the minimum floor space; it lends itself to both direct motor and belt drives; the degree of fineness of the product may be varied as required; and low maintenance and running costs. The power required per ton of pulverised product is given as about 15 kWh per ton on machines having a capacity of 2,000 lb. per hour, and above the latter figure when bitumous coal is employed.

To help in explaining the working and construction of the modern "Atritor" it will be useful to outline briefly its development. As against the old method of crushing or grinding the fuel, the idea was conceived of



A, Path of coal from feeder; B, Cold-air stream; C, Cold-air entrance D, Chute for separated metal; E, Inspection window.

Fig. 2.—Metal Separator on Primary-air and Coal Inlet.

disintegrating the coal by passing it through rows of intermeshing pegs from its entrance at the centre of the pulverising chamber, its ultimate pulverisation to be effected by passing the disintegrated particles of coal through a second stage from the periphery to the centre

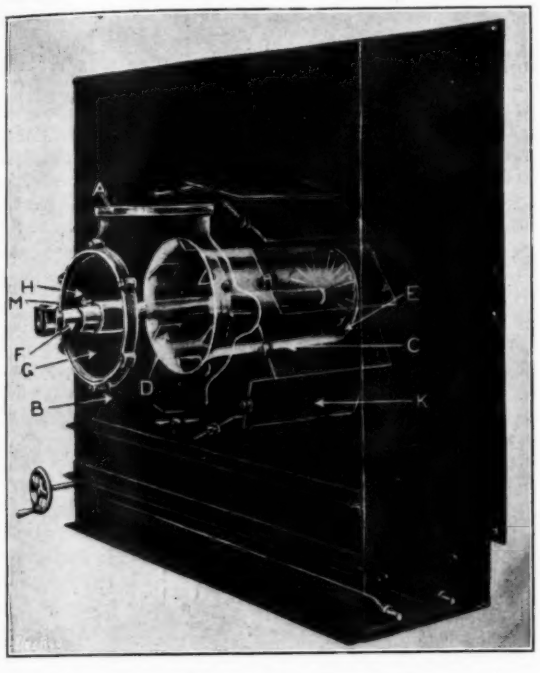


Fig. 3.—Ghost View of " Riley " Burner.

against centrifugal force. The scheme permitted the coal particles to be held indefinitely in a pulverising zone, the centrifugal eddies produced by the moving impellers being counteracted upon by the centripetal effect of the air stream through the mill, which endeavoured to carry the fine particles inward. It was found that the moving pegs created eddies upon which the coal particles were carried; the larger particles selecting the high-velocity eddies, and the finer particles those of low velocity.

When the fixed pegs in the second stage were omitted the ground product was superfine in quality, the power was high and the output low. The explanation is that in this zone were many air-coal streams travelling at widely varying velocities, and the attrition or rubbing effect caused the coal particles to become smaller and smaller in size as they approached the centre. A tendency for the dust cloud to gyrate was overcome by the judicious introduction of fixed pegs to break up the gyratory effect and co-ordinate the problems of output, fineness of grinding and power required. As the selective effect in the pulverising zone was based on a mass-surface principle, many particles, light in weight, but over-sized, were carried to the burner. That difficulty was overcome by a mechanical device, the rejector, which rotated at the same speed as the shaft and rejected the over-sized pieces back to the pulverising zone for further treatment. Experience gained in pulverisation in connection with the cement-manufacturing industry showed that it was practicable to dry and pulverise the coal simultaneously by passing hot air through the mill.

In the modern " Atritor " the peg-type disintegrator has been replaced by a hammer disintegrator which is unaffected by the presence of foreign materials, and a metal separator has been incorporated in the design, so as to trap any such material before it enters the mill. The rotating pulverising elements can no longer be described as pegs, but rather as air beaters or impellers. These are segmental in shape, easily fixed to the steel rotor, and wear very slowly. The new construction is claimed to entirely remove the wear from the rotor plate. Fig. 1 shows the details of the interior of the " Atritor "; the hinged construction is essentially simple and avoids the handling of heavy parts.

The operation of the complete " Atritor " is as follows. The coal is fed into the hopper on the machine and descends on to a horizontal rotating disk. The speading of the coal over the disk is controlled by a sleeve, adjustable for height, and the feed of coal to the machine is regulated by a knife which scrapes the coal off the disk. The position of the knife is controlled by a handwheel. The feeder is specially designed to obtain fine regulation of the coal, and is capable, it is claimed, of dealing with any normal coal containing up to 15 per cent. moisture content. Large detachable covers are fitted for inspection or cleaning purposes when necessary. From the feeder, the coal descends to the separator where all metals and foreign substances, heavier than coal, are rejected from the machine. This separation is performed by a current of air which passes through the separating device in such a direction and with such velocity that it carries the coal into the machine, but fails to sustain or convey heavier materials than coal. Fig. 2 depicts the separator arrangements.

The coal enters the machine about the centre, and is pulverised in two stages. In the first stage there is a number of hammers pivoted freely on the hub that carries the disk. When the machine is running, these hammers are held out by centrifugal force. They catch the incoming coal and beat it against the screen ring which partially surrounds them. This stage is known as the first effect. After passing the edge of the disk, the coal turns inward to the centre, and during its progress the final stage of pulverisation is effected, this being termed the second effect.

Hot air passes into the machine with the coal, and owing to the large surface or contact area of the coal it is instrumental in drying moist coals, without causing either pulverising or combustion difficulties. The hot air may be obtained from the boiler through cavities in the walls of the combustion chamber, or from air heaters placed in the flues of the furnace. Before leaving the second effect of the machine, the coal passes through

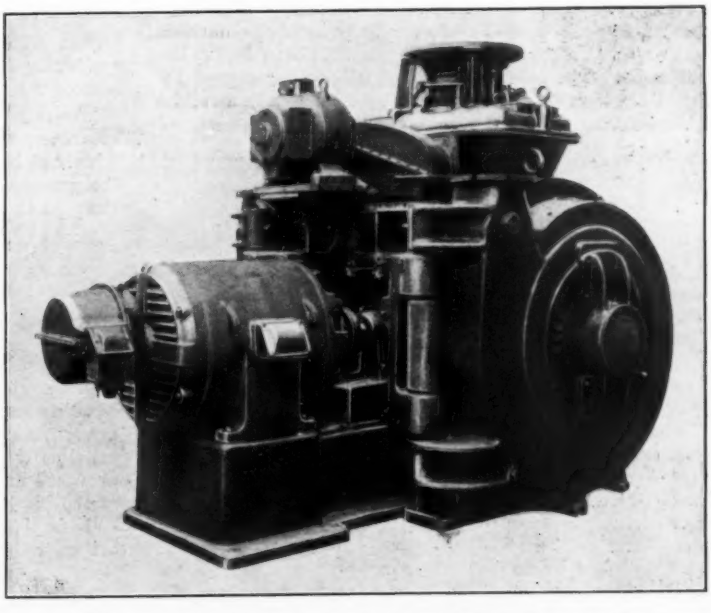


Fig. 4.—No. 24 " Atritor," as Supplied to Hams Hall Power Station, Birmingham.

the rejector, which revolves at the same speed as the shaft. The coal particles of satisfactory fineness are drawn, together with the air, to the fan which projects the dust cloud to the furnace.

The casing of the machine is fitted with renewable liners, and all parts which are subject to wear have been designed to be replaced easily and quickly at a minimum cost. All rotating parts are mounted in ball or roller bearings of suitable size, and the attention required during continuous running is almost negligible.

The maintenance costs for a No. 16 " Atritor " are given in the following schedule of renewals:—

Tons of Coal Pulverised.	Parts to be Renewed.	Cost. £ s. d.	Cost per ton in Pence.
3,000 to 4,000	Hammers Agitator segments Moving peg segments Fixed pegs Rejector arms	11 17 8	0.950
6,000 to 8,000	Fan blades	2 18 6	0.117
9,000	Fan casing liners	16 5 0	0.435
18,000	Body liner	21 0 0	0.28

Total cost per ton of coal pulverised, 1.782d.

Fig. 4 shows a No. 24 " Atritor " as supplied to the new Hams Hall power station of the City of Birmingham Electric Supply Department. Twenty-five " Atritors," each having a pulverising capacity of 4 tons per hour, complete the initial installation at Hams Hall, and five of these serve each 190,000-lb./hr. boiler. Four of the " Atritors " are driven by a.c. squirrel-cage motors, and one by a d.c. constant-speed motor. The supply of coal to the machines, and consequently the burners, is remotely controlled from an operating platform by suitable switchgear operating variable-speed d.c. feeder motors.

It is interesting to note that in the power station at the Alfred Herbert works are; in addition to a small testing boiler of 870 sq. ft. heating surface, two Babcock and Wilcox water-tube boilers of the ordinary land type, all equipped for pulverised-fuel firing with " Atritors " and Riley burners.

The following data concern the two B. & W. boilers, which, when equipped for stoker firing, had each an output of approximately 15,000 lb. per hour. When, however, the boilers were fired with pulverised fuel, after having been equipped with suitable combustion chambers and with water walls on the two sides, the evaporation was found to have increased to from 25,000 to 30,000 lb. per hour. The side walls are of the type designed by Dr. Lulofs, of Amsterdam, the tubes being encased in firebrick tiles.

DATA FOR B. & W. BOILERS EQUIPPED FOR PULVERISED-FUEL FIRING.

Heating surface of boiler	4,483 sq. ft.
" " " superheater	816 sq. ft.
" " " side walls of combustion chamber ...	230 sq. ft.
Steam pressure	160 lb. per sq. in.
Steam temperature	550° F.
Combustion chamber volume	2,200 cu. ft.
" " width	10 ft. 1 in.
" " depth from tubes to floor level	17 ft. 6 in. (mean).
Combustion chamber distance from front to back	13 ft. 6 in.

The Riley flare-type burner is strongly advocated for use in conjunction with the " Atritor." The construction and operation of this burner may best be described by reference to the ghost view given in fig. 3. The discharge pipe from the pulveriser is connected to the flange A at the inlet of chamber B. At the outlet of this chamber and the inlet of pipe C is a number of vanes D arranged parallel to the axis and at an angle to the pipe radius. At the end of the pipe is a coal spreader E carried on a pipe which projects through the outside cover plate of chamber B. This coal spreader is adjustable and held in position by screw H. The pipe C is contained within a plenum chamber, one side of which sets against the furnace wall. The opening in the plenum chamber coincides with a similar opening in the furnace wall. Secondary air is admitted to the plenum chamber through damper M, and within this chamber and surrounding pipe C is a set of vanes K, the axes of which are parallel with the axis of the pipe. Damper M can be located on either side or the top or bottom of the plenum chamber. Chamber B can be installed with the inlet in any position desired, and it can also be reversed, so that the rotation of the pulverised fuel is in the opposite direction. The pulverised coal, carried in suspension by primary or conveying air, enters the chamber B through the flanged connection A and the stream is given a circular motion within the chamber and enters the pipe C while revolving about the axis of the pipe. Since this motion tends to cause the coal stream to travel in a zone adjacent to the inner surface of the pipe, the vanes D are arranged to divert the stream toward the centre. The coal then passes to the tip of the pipe, completely filling the space between the pipes F and C. The vanes E break the coal streams into a number of stratified streams and divert these strata into a conical form or flare.

Secondary air, supplied under pressure from a fan, passes the dampers M which control the quantity of air flowing, and is given a whirling motion in passing between the vanes K. The amount of whirl is determined by the angular position of these vanes. In general the direction of rotation of the secondary air is opposite to that of the primary air and coal in the chamber B and pipe C, but they are so designed that they may be set to give the same direction. Mixing of secondary air with primary air and coal occurs beyond the tip of the burner E. The coal stream issuing from the tip E in the form of a flare is violently whipped by the stream of secondary air issuing through the vanes K, the two streams being in rapid rotation. Impingement of the coal stream on the vanes E results in strata consisting of alternate rich and lean mixtures of coal and air. The rich portions of the stream ignite readily and act as kindling to the remainder of the mixture.

Initial ignition may be secured by means of a kerosene torch. A five-gallon tank of kerosene is mounted on the boiler front wall and a connection made between the tank and point M on pipe F. Kerosene is then permitted to flow through this pipe into the furnace and is ignited by means of a waste torch. Primary air and coal are then introduced without any secondary air. Ignition of this rich mixture is practically instantaneous and occurs without any puff. The dampers M are then gradually opened until the amount of secondary air is correct for the amount of coal being burned.

The degree of the flame is adjusted by advancing or retarding the pipe F and rosette E. With the rosette advanced beyond the end of the pipe C the flare will be the greatest, and with the rosette drawn entirely within the pipe the flare will be the least.

Government Research Staffs.

A committee has been appointed by the Treasury to inquire into matters affecting the functions and staff of certain research and experimental establishments of Government Departments. The scope of this inquiry is practically the same as that of the committee which was proposed by the staff side and rejected by the official side of the National Whitley Council at the meeting of that body in April last, says *The Times*, the main difference being that the Treasury inquiry does not cover the museums, the observatories, or the research services of the Ministry of Agriculture and Fisheries. The staff side of the National Whitley Council is understood to have pointed out to the official side that the appointment for this purpose of an inter-departmental, instead of a Whitley, committee contravenes the spirit and intention of Whitleyism, and deprives the staff of the opportunity, that was definitely intended by the Whitley Council constitution, of being represented on such a body and given an equal share in the determination of its findings.

A Locomotive Snow Plough.

Details of a Swiss passenger and goods train electric locomotive which is also intended to act as a snow plough.

THE Société des Ateliers de Secheron, of Geneva, in conjunction with the Fabrique Suisse des Machines et de Locomotives of Winterthur, has recently completed an interesting electric locomotive that is intended to serve for passenger and goods train haulage and also to act as a snow plough on the Swiss Bernina metre-gauge railway. The line connects the Engadine valley with Italy and is the highest adherence railway in Europe. It is approximately 38 miles in length, and differences in level of no less than 7,963 feet have to be overcome, only about 12 per cent. of the line being on the level. Moreover, 42 per cent. of the track consists of curves, and the temperature in winter falls to from 25 to 30 deg. C. below zero, while in summer snow to a depth of 17 ft. has been encountered. After a careful study of the problem the Secheron Co. submitted plans for an eight-wheel double-bogie locomotive designed to attain speeds of 12½, 6¼, and 3⅛ m.p.h. when hauling a 47-ton train, that weight not including that of the locomotive, each of the four axles being equipped with twin electric motors. The four twin motors, which are enclosed in a common casting, are coupled in parallel when the machine is running at low speed, the small-diameter wheels being driven through gearing and spring couplings, which is considered a better method of overcoming wheel slip on a snow-covered track than that of using motors in series and linking the two axles of each bogie by connecting rods.

Fig. 1.—An Electric Train on the Bernina Railway.

The inter-coupling of the electric motors and the calculation of the starting resistance necessitated careful study in order to obtain as regular a degree of train acceleration as possible. Both for series working at starting and parallel running, a wide range of current graduation has been secured by a judicious choice of resistances and the use of contactors individually operated by compressed air. Furthermore, in order to obviate any train shock when changing the motor couplings, especially on steep gradients, the motor circuits have been arranged to avoid any reduction in power output during the change from series to parallel coupling.

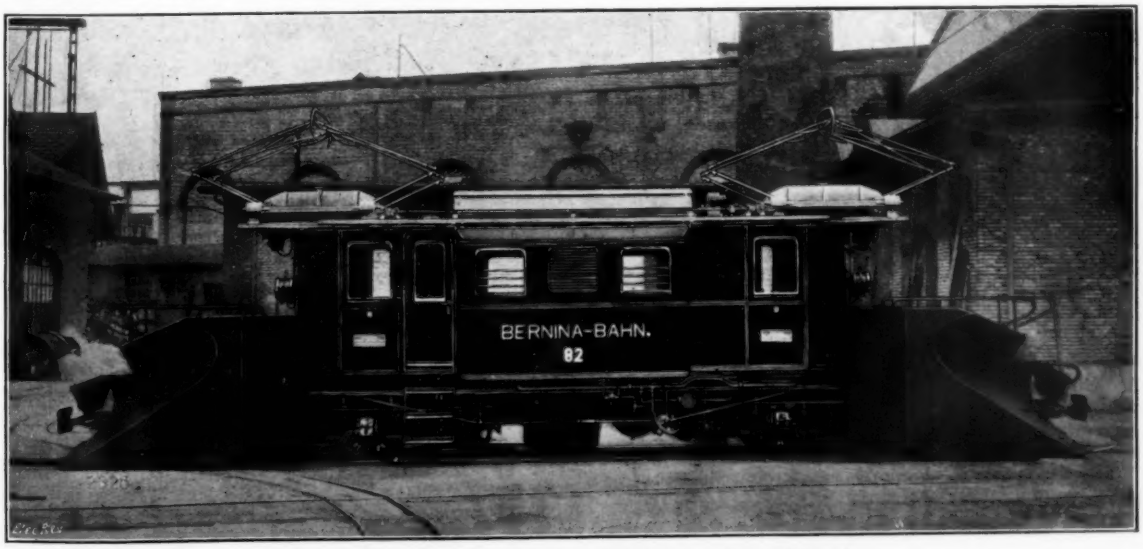
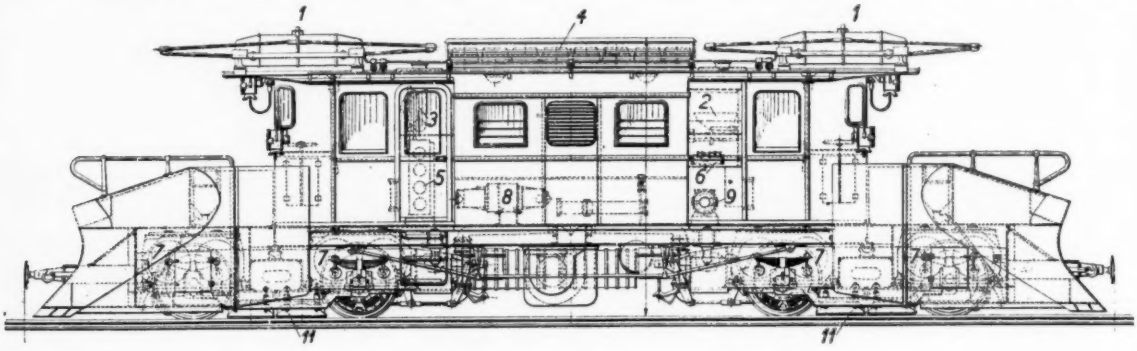


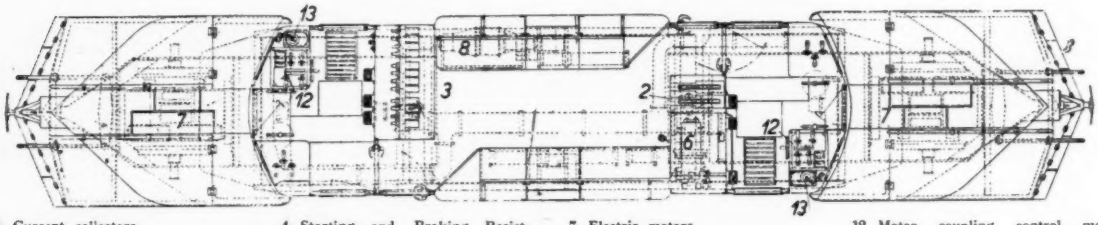
Fig. 2.—Combined Electric Locomotive and Snow Plough.

For normal running the two armatures of each motor are coupled in series and the four motors are connected in parallel with the main circuit. In other cases, the

armatures are connected in parallel. Altogether the engine can be run at eight different speeds: a normal rate and three others (by weakening the field) for each method of armature coupling. Drum-type commutators operated electro-pneumatically are used to effect the field weakening. The motors are reversible, the reversing gear which alters the connections being actuated electro-pneumatically. By means of the same electrical brake working through resistances, and an emergency electro-magnetic brake acting on the rails.

The principal dimensions and weights of the engine are: overall length between buffers, 47¼ ft.; total wheel base, 32 ft. 9 in.; bogie wheel base, 7 ft. 2½ in.; overall width, 8 ft. 2½ in.; diameter of wheels, 38⅜ in.; transmission gear ratio 1 to 7; weight of mechanical part of the locomotive, including vacuum brake, compressor,





1. Current collectors.
2. Main control switch.
3. Running and braking contacts.
4. Starting and Braking Resistances.
5. Reversing gear.
6. Field shunting control.
7. Electric motors.
9. Motor-driven air compresseor.
9. Motor-driven vacuum pump.
11. Electro-magnetic brake shoe.
12. Motor coupling control mechanism.
13. Vacuum brake control.

Figs. 3 and 4.—A Swiss Electric Locomotive and Snow Plough.

gear, any one of the motors, should a fault develop, can be cut out of circuit. The resistances used in connection with the engine are located in the roof of the machine, where they receive ample ventilation.

The engine, which can attain a maximum speed of 31¼ m.p.h., has an axle pressure of 11 tons and is designed to work with direct current at minimum, average, and maximum voltages of 550, 800 and 1,100 V. At a speed of 12½ m.p.h. it is able to develop 500 h.p. continuously at the wheel tyres with d.c. at 800 V.

The braking system comprises a Hardy vacuum brake, a hand brake acting independently on each bogie, an and snow plough, 25 tons 15 cwt.; weight of electrical equipment and transmission gear, 17 tons; miscellaneous equipment, 12 cwt. The total weight of the engine is therefore 43 tons 7 cwt.

A snow plough is provided at each end of the machine, the bottom edge of which can be lowered to within 1 3/5 in. of the rails. As the sides of the plough encompass part of the engine, mounting steps for the drivers are fitted in the front centre and so pivoted that they can be turned up when the engine is snow ploughing. The ploughs are designed to cut a passage 10 ft. 6 in. in width.

The Financing of Export Trade.

An Explanation of the Facilities available to the Electrical Exporter.

By A. W. WILLSMORE.

IN 1927 Great Britain headed the list of competitive countries in the value of exports of electrical goods. The figures for 1928 show that we have now fallen to third place, both Germany and the United States having passed us. This fact is, of course, partly explained by the reparations situation in the case of the one country, and the development of electrical finance in that of the other. At the same time, however, no small part is played by the apathy towards export trade evinced by certain sections of the electrical industry in this country. There are many electrical manufacturers who could find good markets for their merchandise overseas. The reason why they do not take advantage of this fact is in many cases the result of imagined financial difficulties. If foreign customers were prepared to do business on a cash-with-order basis there would be little objection to export trade. In actual practice, however, the foreign buyer wants to have the goods actually delivered before he will pay. And very frequently it is stipulated that payment shall be delayed until two or three months after delivery, often as not in order to enable the buyer himself to sell the goods before he pays for them.

The manufacturer is prepared to grant such facilities

to home customers as a matter of routine, provided of course that their credit standing bears investigation. If the customer resides in a foreign country, however, the manufacturer very often does not feel safe in engaging in business on such terms unless he can afford to pay a personal agent to look after his interests in the country. For the smaller manufacturer this is out of the question. But it is not generally appreciated that the big London bankers are prepared to act as foreign financial agents for their customers in this connection. Or at least, if the fact is known, the maximum advantage is not taken of it.

Banks as Collecting Agents.

One of the features of post-war banking in this country has been the increased attention paid to export finance by the larger banks, and in many instances special departments have been established to deal with this side of the business. Let us take as an illustration the case where a manufacturer has secured an inquiry from a foreign buyer who agrees to pay for the goods on delivery. The first preliminary is, of course, to have an investigation made into the credit standing of the prospective customer. The bank is prepared to make this investigation without any responsibility attaching to its customer, and if the result of this investigation is satisfactory it will be prepared to act through its overseas connections as his collecting agent in the foreign country.

It is common knowledge that when goods are shipped, the master of the ship signs a bill of lading making himself responsible for the goods specified therein. This bill of lading is a document of title. The man holding the bill has legal possession of the goods it covers, and while he keeps it he retains control over his goods. The manufacturer takes this bill of lading to his bank attached to a sight bill of exchange drawn on his foreign customer. The bill of exchange, together with the shipping documents, is sent by the bank to its local agents in the foreign country, and these agents will ensure that the importer pays the full face value of the bill before they relinquish the bill of lading, without which he cannot secure the goods. As soon as they are advised by their agents that the bill has been paid, the home bankers will credit the manufacturer's account with the amount (less the small charges involved), and the manufacturer can immediately draw on this account.

By utilising the services of his bank in this way, the exporter can ensure that the foreign buyer will not secure the goods until he has paid for them, and that he, the exporter, will get his money as soon as his customer has accepted the goods

Granting Credit.

Circumstances may arise where the credit standing of the importer is good and the manufacturer agrees to give him two or three months' credit. In this case the manufacturer would draw a bill payable at two or three months, and present it to his bank with the bill of lading. The bank, through its agents, would get this bill accepted before parting with the shipping documents, and if the manufacturer were giving three months' credit, the bill would fall due for payment three months after it was accepted. In the meantime the manufacturer could wait until the bill matured, when it would be presented for payment by the agent and the money credited to the manufacturer's account by his bank, or, alternatively, the manufacturer could arrange to have the bill returned to him to be discounted.

The problem arises, however, that, although the credit standing of the customer in his own country may be excellent and his financial standing good, he may be entirely unknown in the manufacturer's country, so that the manufacturer would have to pay relatively high rates for discounting. Under such circumstances a more satisfactory means of settlement is by confirmed bankers' credit if the buyer can be persuaded to adopt this method of payment.

Documentary Credit.

This confirmed bankers' credit substitutes for the credit of the buyer the credit of a bank. The buyer gives his own bank full particulars of the proposed transaction, and asks it to arrange with the bankers of the seller for the credit to be opened. It can be arranged for this credit to be a confirmed credit or an unconfirmed credit. If it be unconfirmed, the credit can be cancelled by the buyer with or without notice. A confirmed credit, however, is irrevocable and can only be cancelled with the sanction of the party who benefits under the arrangement (in this case the seller). Obviously, therefore, the seller would only agree to the credit being unconfirmed where he had absolute confidence in his customer, and in the majority of cases it is better to demand confirmed credit.

If the credit standing of the intending buyer is satisfactory, his bankers will request the London bank to open the required credit in favour of the seller of the goods. The London bank will write to the seller to inform him that the credit has been opened, and the seller can immediately draw on this amount by submitting a documentary bill (*i.e.*, a draft accompanied by the shipping documents covering the goods which are the subject of the transaction). Unless he has agreed to allow his customer time to pay, the seller can in this way obtain his money immediately after shipment. If he has allowed his customer credit, he will present with the shipping documents a bill payable at the end of the credit period. This draft, which is presented with the documents, will be accepted by the London bank, and the seller can then, if he desires, discount the accepted bill in the open market. Being an approved bankers' acceptance, very low rates will be charged for discounting.

The Government Scheme.

We have so far dealt with the finance facilities available to the electrical manufacturer through his bank. It is, however, well known that the Government is also prepared to help in this connection through the Export Credits Guarantee Scheme. The principle of this scheme is that the Government is prepared "to guarantee the payment at maturity of accepted bills of exchange drawn in connection with the export of British goods." It will be appreciated from this that the main feature of the Government scheme is that it offers insurance facilities. The scheme has, however, now been extended so that finance facilities can be granted as well as insurance.

The Export Credits Guarantee Department provides two forms of contract: Contract "A" provides insurance facilities only; Contract "B" provides finance and insurance facilities. If a manufacturer secures a Government guarantee under Contract "A" he can draw a bill on his foreign customer and get it accepted, safe in the knowledge that if his customer should fail to pay the bill on maturity, then the Government will immediately pay the amount of its guarantee (which may be up to 75 per cent. of the face value of the bill). In addition, the Government will take any legal action necessary against the defaulting buyer, and will share with the exporter *pro rata* in any amount that it may recover from the debtor. For instance, if the manufacturer insures a transaction for 75 per cent. involving £10,000 and the bill drawn in that connection is not honoured at maturity, the Government will, upon being notified of the fact, immediately pay the manufacturer £7,500, thus leaving 25 per cent. of the original sum as the initial loss to the manufacturer. Whatever sum the Government recovers from the debtor the manufacturer will be credited with 25 per cent. of that sum, so that if the debtor can be induced to pay in full, the exporter receives his debt in full.

Of course, the Government will only insure transactions with foreign customers whose credit is considered sound, and the premium charged for insurance will depend upon the amount of risk involved and the credit standing of the importer. The premiums are, however, quite reasonable, as is shown by the fact that during

the first quarter of this year exports to the value of £1,716,800 were insured under the Government scheme. This figure is more than double that for the corresponding quarter of last year, and since the existing scheme was initiated in July, 1926, the transactions handled by the Department exceed £7,000,000, nearly 25 per cent. of which represents business in the first three months of this year.

The manufacturer can treat each inquiry as an individual transaction or he can arrange for the Government to guarantee short-term bills drawn on a list of customers in a particular market up to a specified amount. The advantages of the scheme are obvious. Not only is the risk run by the manufacturer considerably lessened, but there is the added advantage that he is completely relieved of the necessity of taking legal proceedings in a foreign court.

Even greater benefits, however, are to be found under Contract "B," where, in addition to the insurance facilities considered above, the manufacturer is given facilities for "obtaining advances from his bankers at fine rates without recourse to himself." That is, in effect, he gets a Government endorsement to his bill. The procedure is similar to that described above, but in addition the Government gives an unconditional guarantee to the manufacturer's bank on the bill of exchange, and on the strength of this endorsement the bankers are prepared to discount the bill at very low rates.

Long-term Credits.

In the preceding paragraphs we have referred to the fact that where a manufacturer grants credit to his customer he can himself discount the accepted bill of exchange and so obtain the use of his money before the bill matures. It should be appreciated, however, that this only applies to short-term bills of less than six months' duration. The average bank is not prepared to finance long-term bills of exchange, because it cannot afford to lock up its resources for a long period. Nevertheless, the exporting manufacturer is often expected to give anything up to five years' credit on certain transactions. Especially is this the case in connection with electrical export trade where British manufacturers often have to compete with foreign firms who are prepared to wait two, three, or even more years for payment. In order to fill this gap in British financial machinery, the Export Credits Scheme has been extended to cover long-term credits. The scheme is in principle the same as that described under Contract "B," but arrangements are made for the ordinary six months' bills to be drawn under an agreement to renew them throughout the period of credit. These bills, as before, are endorsed by the Government, and as such are a first-class banking security and can be discounted at very low rates. Arrangements can also be made under the long-credits scheme for payments by instalments, and the Government is always prepared to consider special arrangements for exceptional contracts.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

Correction.

In the "Index to Advertisers" in our last issue we gave an entry Fuel Control, Ltd., sup. page 32, but owing to late arrival of matter the advertisement of Combustion Steam Generator, Ltd., of 1, Southampton Row, W.C.1, was published on that page; the former company had no advertisement in that issue.

The British Industries Fair.

Arrangements for the Heavy Section of the 1930 British Industries Fair in Birmingham are even more advanced than at this time last year, when the whole of the stand accommodation was booked seven months before the opening; more than 60 per cent. of the space has already been let. Approximately one-fifth of the firms have already taken advantage of the opportunity offered them to secure their stands for five consecutive years. This early reservation of the major portion of the space greatly facilitates a policy of grouping kindred interests which was put partly into operation last February and is to be considerably extended in 1930. The system of alignment recently introduced—by which all stands have frontage to straight avenues one-third of a mile long—was the first important step towards a new development of progressive grouping which will add to the convenience of trade buyers not only in bringing the leading industries more closely together, but also in permitting allied trades to congregate in proximity to them. The new scheme, moreover, is so devised, taking into account the proposed building extensions for 1930 and future Fairs, that any industrial section can automatically expand to any dimensions, still retaining its unity of interest without disturbing the similar grouping of any other section. The principal officers of the 1930 Birmingham Section are as follow: President, Mr. Walter Barrow (Cadbury Bros., Ltd.); vice-president, Mr. John Belliss, M.I.Mech.E. (Belliss and Morcom, Ltd.); chairman of the Fair Management Committee, Mr. E. W. Bache (Geo. Salter, Ltd.); vice-chairman, Mr. C. Holland Harper (John Harper & Co., Ltd.); deputy-chairman, Mr. G. N. Guest, M.I.Mech.E. (Hollings & Guest, Ltd.); hon. treasurer, Mr. C. E. Greener (W. W. Greener, Ltd.).

Northern Contractors' Annual Meeting.

The annual meeting of the Northern Section of the Electrical Contractors' Association was held on May 29th in the Small Conference Hall at the North-East Coast Exhibition. Representatives of all the branches in the six northern counties were welcomed by the Lord Mayor of Newcastle; Mr. H. C. Hazel, chairman of the Section and vice-president-elect of the E.C.A., presided. The Lord Mayor said that he had willingly accepted the invitation of Mr. R. Robson, the hon. secretary, to attend the meeting. He referred to the Exhibition, making special note of the scheme of illuminations, and said that in two weeks there had been half-a-million visitors, and the organisers were doing their best to sustain public interest. The Sheriff of Newcastle said that the contractors' visit coincided with a distinct improvement in business, and he hoped that brighter and better days were at hand.

In proposing a vote of thanks to the Lord Mayor and Sheriff, Mr. W. H. Walton (president of the E.C.A.) said that the Exhibition must eventually have a great effect upon the industries of the area, improving trade and providing employment. The vote was seconded by Mr. H. Willoughby Ellis (president-elect of the E.C.A.). At the meeting Mr. T. H. Beardsall was elected chairman for the ensuing year and retiring delegates to the National Council were re-elected. In addition to those already named there were present at the meeting Mr. L. C. Penwill (general secretary of the E.C.A.) and Mr. R. W. Kennedy (editor, *Electrical Contractor*). After the meeting the members partook of luncheon, at which Mr. A. B. Maclean (one of the consulting engineers to the Exhibition), Mr. P. W. Wood (resident engineer), and Mr. J. C. Graham (secretary of the Newcastle branch, E.C.A.) were present.

The Electrical Imports of Uruguay.

During 1928 electrical materials valued at $937,940 (£187,590) were imported into Uruguay, as compared with $993,558 (£196,710) in 1927. In Uruguay's foreign trade generally Great Britain was the principal customer, but was second to the United States in the list of suppliers.

Moulded Glass Lighting Fittings.

In a recent re-arrangement of their showrooms, Messrs. CAMILLE ESPIR, LTD., 19, Hanover Square, W.1, have made a special display of moulded glass lighting fittings. For some time this class of fitting has enjoyed a considerable vogue as it can be produced in a wide variety of styles and designs. The models displayed by the company include ball pendants, panelled pendant fittings, wall panels, and cornice fittings. The wall panels offer an especially wide choice, as they are made in many forms—rectangular, triangular, hemispherical,

Messrs. Camille Espir's Showrooms.

shell and other shapes. The accompanying illustration depicts the part of the showrooms devoted to these fittings. Other attractive lines which are to be seen at the showrooms are conical Celanese shades produced and decorated most artistically; and a large range of wood fittings, including a number of nursery patterns which should delight the young mind.

For Sale.

The West Central Merchandise Mart will sell by auction at York House, Southampton Row, W.C., on June 13th, English and Continental lighting cables, electrical fittings, and radio goods. Fuller, Horsey, Sons & Cassell will sell by auction on June 19th, at the depôt adjoining the main entrance of the Wembley Exhibition Grounds, electrical plant and stores removed from Wembley Exhibition. (See our advertisement pages to-day.)

German Price Increases.

Owing to the increasing cost of copper and its alloys the Central Union of the German Electro-Technical Industry has recently announced an advance in prices. Arc lamps, starters, and electrical machinery accessories are up to the extent of 5 per cent.; electrical machinery, tools, rectifiers, switchgear and installation material 7½ per cent.; transformers 10 per cent.; and low-pressure apparatus 15 per cent. Higher advances are in operation in the case of electrical material which comprises more than 50 per cent. copper.

The Marking of Imported Glassware.

The Merchandise Marks Act inquiry concerning the application of British glass makers for an Order requiring imported illuminating and other glassware to bear an indication of the country of origin was resumed on May 29th.

Mr. N. L. Macaskie, on behalf of the opponents, said that although the applicants asked for an Importation Order, no evidence justifying the application had been given, and no attempt had been made to deal with the difficulties which would be encountered by the Customs authorities. Manufacturers of lighting fittings would be seriously handicapped if the glass which they used had to be marked; this glass formed but a small proportion of the total cost of the completed article. If the Committee saw fit to recommend an Order, then they asked that the marking should be by means of labels, as that was the most practicable method, although it would involve inconvenience and expense. He also asked that if an Order were recommended a considerable interval of time, say, six to nine months, should be allowed to elapse before it came into operation to enable existing stocks to be cleared.

Mr. Wethered, replying for the applicants, said that manufacturers objected to marking only because they did not desire to let their customers know that they were using foreign glass. Referring to the evidence given on behalf of the Chloride Electrical Storage Co., he said that the ground of objection was not, as in the case of illuminating glassware, that the mark would disfigure the accumulator and battery containers, but that the company desired to have an alternative supply to that obtained in this country, but at the same time the desire was expressed that this foreign glass should not be marked owing to the fear that it would prejudice the sales of the company's products. He suggested that this was not an adequate reason for asking the Committee not to recommend an Order. The Chloride Co. was obtaining the bulk of its supplies from English makers, but the applicants did not feel that the company was justified in making the suggestion.

At the conclusion of the hearing on May 29th, Mr. Wethered maintained that the evidence had proved that the cost of marking was negligible. He urged that, if the Order were made, the Committee should not sanction marking by means of adhesive labels, which was considered unsatisfactory. The applicants asked that blown and pressed glassware should be marked indelibly, and that the marks on coloured glassware should be applied in colours contrasting with the colours of the glassware itself. Further, it was necessary that the glassware should bear the marks at the time of importation, because it was difficult even for the experts to distinguish between the British and foreign glassware if it were unmarked.

The Committee will submit its report to the Board of Trade in due course.

On Monday last an inquiry into an application for an Order requiring the marking of imported scientific glassware was commenced.

Cheap Electricity.

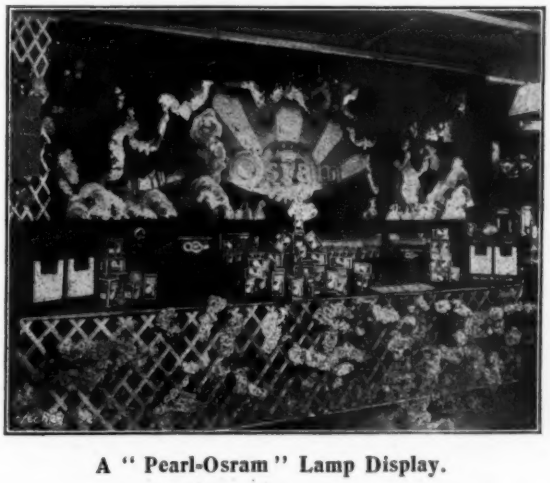
When there are such places as all-electric towns in this country Wimbledon should be one of the first. For a long time it has had a reputation for the cheapness of its electricity, and now a further step in the downward direction is announced. We are informed by the chief engineer and manager (Mr. A. E. McKenzie) that during the September, 1929, quarter all electricity consumed for cooking, heating, and water-heating will be charged for at a flat rate of one halfpenny per unit, without any restrictions, minimum charge, or other qualification. This represents a reduction of 33⅓ per cent. on the present summer tariff and 50 per cent. on the winter tariff. It is anticipated that the reduction will result in a largely increased output during the summer months, and thus make it possible for the low tariff to be operated throughout the six summer months in future years. The pamphlet containing this information is justly entitled "An Announcement Worth Reading." We may mention that the flat rate for domestic lighting in Wimbledon is only 3½d. per kWh.

The Quest for Markets.

At the Advertising Convention to be held at Newcastle-on-Tyne from June 15th to 19th, proprietors of industrial papers will take part in the proceedings for the first time. The theme of the convention is the "Quest for Markets," and there are few more important questions affecting industry at the present moment. Sir E. Iliffe, M.P., will preside on Monday, June 17th, over the "Industrial Press" session, when the speakers will be Sir Gerald Chadwyck-Healey, Bart., C.B.E. (chairman, Morgan Bros. (Publishers), Ltd.); Mr. V. Watlington (managing director, English Electric Co., Ltd., chairman, B.E.A.M.A.); Mr. E. M. I Buxton (Paul E. Derrick Advertising Agency); and Mr. Percival Marshall (chairman, P.T.P. and W.N.P.A.). It is anticipated that the speeches at this session will provide points of interest to manufacturers who are concerned with the industrial Press.

An "Osram" Display at Liverpool.

Now and again Messrs. Lewis, the prominent Northern proprietors of departmental stores, stage very effective electrical displays at their premises. The accompanying illustration shows an "Osram" display recently arranged at the



A "Pearl-Osram" Lamp Display.

company's Liverpool stores. This was devoted to pointing out the advantages of "Pearl Osram" lamps. Upon the counter there was an arrangement of lamps and cartons and cards announcing the recent price reductions. The background was reminiscent of Watteau or Fragonard, and had a "summery" atmosphere. In the front there was a garlanded trellis, behind which a number of electrical appliances were arranged.

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Price Reductions.

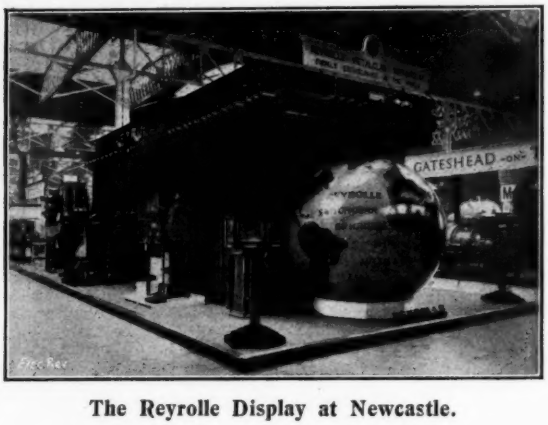
The GENERAL ELECTRIC CO., LTD., announces reductions in the prices of its automobile lamps rendered possible by standardisation. Of the 13 lamps affected the majority are "BAS" lamps, that is, lamps standardised in accordance with Specification No. 104 of the Society of Motor Manufacturers and Traders, and accepted as standard by all manufacturers of motor-car accessories, motor-cars, and automobile lamps.

An Industrial Mission to Canada.

Under the auspices of the Incorporated Sales Managers' Association of Great Britain, a party of British manufacturers and sales managers is to make a tour of Canada, commencing in August. Visits will be paid to the principal cities, and arrangements have been made for the members to meet representatives of their particular industries, as well as the principal trade organisations of the Dominion.

Reyrolle's Stand at the Newcastle Exhibition.

We reproduce herewith a view of the stand arranged by Messrs. A. Reyrolle & Co., Ltd., at the North-East Coast



The Reyrolle Display at Newcastle.

Exhibition. Upon this side of the display there appear examples of the company's heavy switchgear. Other sides of the stand demonstrate some of the smaller equipment made at Hebburn—such as switch-plugs, fusegear, &c.

Book Notices.

"*Transactions* of the Fuel Conference, London, 1928," in three vols. Pp. clii+3,856 and Index vol. London: Percy Lund, Humphries & Co., Ltd. Price £12.

Science Abstracts A and B. Vol. XXXII. Part 5. May 25th, 1929. London: E. & F. N. Spon, Ltd. Price 3s. each.

"New Developments in Auxiliary Testing Equipment." A serial report of the Meter Committee, 1928-1929, of the Engineering National Section of the National Electric Light Association (U.S.A.). Price 55 cents.

Trade Announcements.

The business of Messrs. KIRK, WILSON, LTD., electrical engineers and contractors, Lincoln, has been acquired and reorganised by Messrs. Wm. Wright & Sons (Lincoln), Ltd., Park Street, Lincoln. The business will now be known as Kirk, Wright & Co., and Mr. J. P. Kirk will act as general manager.

Messrs. MAWDSLEY'S, LTD., Dursley, Glos., inform us that their Midland representative, Mr. J. E. Horsburgh, Sutton Coldfield, is resigning on June 10th, and that Mr. F. G. Ketelbey, of Worcester Chambers, New Street, Birmingham, will represent them after that date.

The Cardiff branch of PHILIPS LAMPS, LTD., is being removed as from June 10th from 27 to 11, Womanby Street; the telephone number and telegraphic address will not be altered.

Mr. CECIL VEITCH, electrician, of Prestwick, Ayr, has removed his business to Royal Bank Buildings, Gardiner Street.

Mr. LOUIS HOLZMAN has removed to 37, Newman Street, W.1.

Italian Lamp Production.

According to figures just published by *L'Energia Elettrica* the output of electric lamps in Italy during last year amounted to 16,127,533, as compared with 12,425,002 in 1927, an increase of just over 13 per cent.

Direct Labour at Mansfield.

A long discussion accurred at a recent meeting of the Mansfield Town Council on the subject of direct labour for wiring installations. The Electricity Committee's minutes contained a recommendation that all future installation work should be carried out by the Department. A member of the Council, opposing this, stated that the Department's tender for the work was 35 per cent. above the lowest offer received from local electrical contractors and 20 per cent. higher than the one next to it. Moreover it exceeded by 22 per cent. the price which the Council had paid for the work hitherto. On behalf of the Committee, the Mayor said that on previous occasions the contractors had formed a "ring" to fix prices and the Council was fortunate in finding a man outside the "ring" to quote a low price. He maintained, however, that the Department could have carried out the work considerably cheaper. The matter was eventually referred back to the Committee.

Bankruptcy Proceedings.

C. B. MARSDEN, rear of 60, Pisgah Street, Kenfig Hill, Glam., electrical engineer.—The first meeting of creditors was held on May 30th at Cardiff. According to the statement of affairs there were liabilities amounting to £213, and a deficiency of £141. Debtor attributed his failure to losses on small contracts through breakages and under-estimating on contracts. The matter was left in the hands of the Official Receiver.

R. BLOOD, wireless dealer and electrician, 44 & 46, Station Road, Padiham.—Receiving order made May 27th, on debtor's own petition. First meeting June 10th, at the Official Receiver's office, District Bank Chambers, Blackburn. Public examination June 18th, at the County Court House, Burnley.

S. E. HUNT, electrical engineer and contractor, 8a, Torwood Street, Torquay.—First meeting June 7th, at the Official Receiver's offices, Exeter Bank Chambers, Broadgate, Exeter. Public examination June 27th, at the Castle, Exeter.

C. R. W. ROWED and A. E. SMITH (Rowed & Smith), electrical engineers and house decorators, 1a, Alexandra Road, Ellacombe, Torquay.—Trustee, Mr. W. R. Cocks, Official Receiver, 67, High Street, Exeter, released May 13th.

C. L. WEEKS (C. L. Weeks & Co.), electrical engineer, 27a, Charles Street, Newport, Mon.—Trustee, Mr. E. Owen, Official Receiver, 34, Park Place, Cardiff, released May 10th.

T. W. BOWLER, trading with J. Cave as Taylor & Wynne, electrical engineer, back of 180, Green Lanes, Small Heath, Birmingham.—Last day for proofs for dividend, June 17th. Trustee, Mr. C. Hoult, Official Receiver, 191, Corporation Street, Birmingham.

R. YEEND (Central Electrical Works), electrician, 57, West Street, Wisbech, and 37, Red Lion Street, Spalding.—First and final dividend of 7d. in the £, payable June 11th at the Official Receiver's office, 41, Sidney Street, Cambridge.

S. H. SKIPPER (S. H. Skipper & Co.), 35, Broad Bridge Street, Peterborough.—Receiving order made May 25th, on debtor's own petition.

G. A. RANGER, cycle and wireless dealer, &c. (Terminus Garage & G. Ranger), 1889, Pershore Road, Kings Norton, Birmingham.—First meeting held June 5th, at the Official Receiver's office, 191, Corporation Street, Birmingham. Public examination, June 26th, at the Court House, Birmingham.

W. M. HORSFALL, electrical engineer, 7, Redcross Street, Liverpool.—Fifth dividend of 4¾d. in the £, payable at the offices of the Official Receiver, Government Buildings, Victoria Street, Liverpool.

E. TEMPLE, separate estate (Westoe Electrical Co.), wireless dealer and electrical contractor.—First and final dividend of 20s. in the £, payable at the Trustees' office, 48, Pilgrim Street, Newcastle-upon-Tyne.

Company Liquidations.

DE LUXE CARS, LTD., 189, Regent Street, W.—The first meetings of the creditors and shareholders of this company were held on May 30th at Carey Street, W.C. A statement of affairs was presented showing total liabilities of £7,763 (unsecured £4,997), assets valued at £2,125, and a deficiency of £4,851 with regard to contributories, the issued capital being £358 in £1 ordinary shares. Mr. H. P. Naunton, Assistant Official Receiver, reported that the company was incorporated in December, 1927, as Portable Wireless, Ltd. The name was changed to its present style in September, 1928. The promoter, T. F. Cowan, was one of the first directors, and acted as managing director at a salary of £20 a week, but ceased to hold office on being adjudged bankrupt on January 18th, 1929. The company acquired from Cowan, a business of wireless manufacturers, the consideration being £501, payable as to £250 in cash and £251 in shares. Cowan had stated that the circumstances which led to the promotion of the company were that for two months he had bought and sold portable wireless sets from his private house, and had made a profit of £10 on each set. He had no plant or machinery. The assets acquired by the company consisted of two wireless sets which had cost £40 each. The company appeared to have started business with a cash capital of £156, of which £150 was provided by A. J. Parsons, who received a debenture for £100, which was subsequently redeemed. The business of dealing in wireless sets was continued until May, 1928, when the company had added a garage and car-hire business. To secure managers for the garages and to raise capital, the company advertised inviting applications for the posts, the applicants to invest £500 in the business. Four appointments were made, the applicants providing in all £1,850, in consideration for which they were to receive salaries of £5 a week and 5 per cent. commission on the profits. Those loans had not been repaid, and debentures for £1,400 held by three managers were stated to be invalid, having been issued for a past consideration and within three months of the winding-up petition. The chairman added that the company had traded at a loss of £7,476, and although the gross assets were returned at £3,269, they chiefly consisted of leases which would not

produce anything, while the other items would only realise about £35. The failure of the company was attributed to heavy overhead charges, cost of working up the business, want of working capital, and want of supervision at the branches. The liquidation was left in the hands of the Official Receiver, who observed that there were several matters calling for a searching investigation.

UNEEDA MAGNETO CO. (LEEDS), LTD.—A meeting of members is called for June 27th at 26-27, Bond Street, Leeds, to hear an account of the winding up from the liquidators, Messrs. V. Walton and J. H. Alexander.

RADIO ELECTRIC CO. (BOURNEMOUTH), LTD.—Winding up voluntarily.

A petition for the winding-up of the company has been presented to the County Court of Dorsetshire and Hampshire by the East London Rubber Co., of 29, 31 & 33, Great Eastern Street, E.C., and will be heard at the Law Courts, Bournemouth, on June 18th.

PRESTEIGN ELECTRIC CO., LTD.—A meeting of creditors is called for June 10th, at the Post Office, Presteign.

WORMIT ELECTRIC LIGHT CO., LTD.—At a recent meeting of creditors, the voluntary liquidation of the company was approved and the appointment of joint liquidators confirmed.

Private Arrangements.

C. L. F. JONES, electrical and wireless engineer, Colwyn Avenue, Rhos-on-Sea.—A meeting of creditors was held on May 24th at Colwyn Bay, when a statement of affairs was submitted which showed liabilities of £600. The assets were valued at £177. It was reported that the debtor entered the electrical trade as an apprentice to a well-known firm. After he had completed his apprenticeship he continued with the firm until he joined the Army in 1915. He was discharged in 1918, but his health was affected, and he had to relinquish his employment. In April of last year he commenced trading on his own account, and, according to the books, the purchases during the period of the trading had been £90, with sales of £1,116, and there was a gross profit of £316. The expenses, however, exceeded £300. A resolution was passed confirming a deed of assignment already executed, conditional upon certain cash creditors withdrawing their claims. A committee was also appointed consisting of the representatives of Metro-Vick Supplies, Ltd., and B.N.B. Wireless, Ltd. The following are creditors :—

	£		£
Hollindrake, H., & Sons, Ltd.	20	Beardsall, E., & Co., Ltd.	80
B.N.B. Wireless, Ltd. ...	25	Marconiphone Co., Ltd. ...	30
Metro-Vick Supplies, Ltd.	11	Revo Electric Co., Ltd. ...	26
		General Electric Co., Ltd.	25

P. JONES and J. H. MERCER, lately trading as the Northern Wholesale Electrical Supply, 266 & 268, Holloway Road, N.7.—A circular has been issued to the creditors herein by Mr. O. G. Sunderland, 15, Eastcheap, E.C., stating that in January last a deed of assignment was executed in his favour. At that time the liabilities were estimated at £1,051, against assets expected to produce £1,249. The estate has been realised, and has produced £1,197, and a dividend of 20s. in the £ has been paid. The creditors were entitled to interest at the rate of 4 per cent., but they were asked to forego this interest and accept a dividend of 20s. in the £ in full and final settlement. A committee of the principal creditors recommended that the dividend should be accepted.

Dissolution of Partnership.

BREWER & BRUNT, electrical engineers and electricians, 17, Albert Road, Hoylake.—Mr. A. G. Brewer and Mr. W. H. Brunt have dissolved partnership. Mr. Brunt will attend to debts and continue the business.

Receiver Appointed.

JOHN BUTLER & CO., LTD., Stanningley Ironworks, Leeds.—Sir W. H. Peat (Messrs. Peat, Marwick, Mitchell & Co.) has been appointed receiver for the debenture holders. It is his intention to complete most of the contracts in hand.

Electricity in Any Event.

From the current "Galliers' Electrical Bulletin" :—Weather forecast for June: We are not able to supply one, but at Galliers' you will be able to get either an electric fan or an electric heater, whichever may be requisite.

The Dudley E.D.A. Circle.

There was a large gathering of electrical people at a recent meeting which was held at Dudley, under the auspices of the Midland Circle of the British Electrical Development Association. The circle has recently been formed, and the object of the meeting was to impress on all interested in the industry the advantages to be gained by joining E.D.A. Mr. G. R. J. Parkinson, M.I.E.E. (manager and engineer of the Midland Electric Corporation for Power Distribution, Ltd.), the chairman of the circle, presided, and the speaker was Lt.-Col. W. A. Vignoles, D.S.O. (director and secretary of E.D.A.). Mr. Parkinson pointed out that of the electricity sold in the Dudley area, 95 per cent. was used for industrial purposes, and only 5 per cent. for domestic uses. In view of this the information which E.D.A. was collating and would shortly publish comparing oil engines and electric motors for driving purposes would be of the utmost value to them.

Dutch Enterprise in France.

It is reported that the N. V. Splendor Gloielampenfabrieken of Nijmegen has established a subsidiary company in Paris under the title of "La Lampe Splendor" for the sale of its manufactures in France.

The German Conductor Wire Syndicate.

In April last the German Conductor Wire Syndicate was re-established in the form of a price convention, and the rebates were reduced in such a manner that the sale prices were increased by an average of 8 per cent. As almost all the large works belong to the convention it is assumed that a tighter control over the market will be gained. The convention will in the first place regulate prices in the home market. The recent slackening in the demand for insulated wires is assumed to have resulted from the increase in prices. On the other hand exports of insulated wires have increased in recent months, the monthly average in the first quarter of this year having been 1,200 tons, as against about 900 tons in 1928. The chief buyers in recent months are said to have been England, Holland, China, the Dutch Indies, and Argentina.

A German Working Agreement.

The Frankfort correspondent of the *Financial Times* reports that the Elektricitäts A.G. of Nürnberg, formerly Schuckert and Co., and the Licht and Kraft A.G., of Berlin, members of the Siemens combine, have decided to co-operate more intensively. This plan, which is a reflection of the tendency to combine in the international electric market, is the direct outcome of the scheme by which the Siemens concern is bringing about a closer co-operation with the firms of which it is composed. The Siemens concern is known to be about to conclude an important agreement with its former daughter company, Siemens Bros., of London, with which firm it will probably co-operate in the future on the world's market.

New Catalogues and Lists.

MESSRS. ELLIS & COE, 308, King Street, Hammersmith, W.—A leaflet drawing attention to the "Kausis" electric brander for branding wood, cork, ebonite, leather, rubber, &c.

IGRANIC ELECTRIC CO., LTD., 149, Queen Victoria Street, E.C.4.—Publication No. 6477, describing the Igranic-Elkon rectifiers and high-capacity condensers. Priced.

MESSRS. SIEMENS-SCHUCKERT (GREAT BRITAIN), LTD., New Bridge House, 30-34, New Bridge Street, E.C.4.—An illustrated brochure describing telephone and signalling installations for business houses and offices.

MESSRS. WILLIAM GEIPEL, LTD., Vulcan Works, 156-170, Bermondsey Street, S.E.1.—Bulletin No. 75, issued by the Ward Leonard Electric Co., of New York, giving installation and maintenance instructions for "Vitrohm" resistance and reactance dimmers, for which Messrs. Geipel are sole agents for the United Kingdom and Europe.

METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester.—Descriptive leaflet No. 460/2-1, dealing with the company's central flow surface condensers, and giving illustrations of actual installations. Also a well-produced and fully-illustrated brochure (pp. 48) giving a short survey of work carried out by the company in connection with the electrification of British railways. A map (scale, one inch to a mile) showing the electrified railways of London and the surrounding districts is included.

VERITYS, LTD., 31, King Street, Covent Garden, W.C.2.—Publication No. 1069, dealing with "Verity-Heemaf" high torque motors, "Aston" control gear, and main switchboards (illustrated), together with a stock list of motors.

Messrs. COURTNEY RUSSELL & CO., LTD., 31, Fitzroy Square, W.1.).—A loose-leaf pocket catalogue showing some of the company's lighting fittings, including French pressed glass and crystal fittings. Priced.

MIDLAND ELECTRIC MANUFACTURING CO., LTD., Barford Street, Birmingham.—An illustrated and priced folder outlining the advantages of M.E.M. small ironclad fuseboards for industrial use.

A. E. G. ELECTRIC CO., LTD., 131, Victoria Street, S.W.1.—Four illustrated publications dealing with industrial lighting equipment for both interior and outdoor use.

ALLIANCE WHOLESALE, LTD., 62, Great Russell Street, W.C.1.—A leaflet giving particulars of the "Russell-Laxnot" fire alarm unit.

RIPAULTS, LTD., King's Road, St. Pancras, N.W.1.—An illustrated booklet describing the company's automatic system of lubrication for motor chassis and all kinds of machinery.

Messrs. FALK, STADELMANN & CO., LTD., Veritas House, 83 to 93, Farringdon Road, E.C.1.—Catalogue No. 615, illustrated and priced, drawing attention to "Antarctic" electric fans.

Messrs. GENT & CO., LTD., Faraday Works, Leicester.—Leaflet No. 186, illustrating interchangeable and combined wave coils for the Mullard S.G.P. wireless receiver.

ELECTROSERVICE, LTD., 3, Waterloo Road.—An illustrated and priced pamphlet of "Frigid" fans.

MESSRS. WADKIN & CO., Green Lane Works, North Evington, Leicester.—Booklet No. 205, containing illustrated descriptions of cross cutting and trenching machines.

MESSRS. BAXTER & CAUNTER, LTD., 219, Tottenham Court Road, W.1.—June price list of electrical equipment, including "Ashdown" moulded accessories, "Credalux" reflectors and lanterns, motors, generators, electrical accessories, &c.

Prices of Materials.

Messrs. F. Smith & Co. and Messrs. James & Shakespeare report, June 4th:—No change in copper and lead prices.

Messrs. Edward Till & Co. report, June 4th:—India-rubber, Para fine, 10½d., ⅜d. dec

Reporting on June 1st, Messrs. James Forster & Co. stated that very quiet conditions prevailed in the lead market last week pending the result of the General Election and the settlement of the reparations question. The revival in demand from consumers in this country and on the Continent, so long expected, has failed so far to materialise, and it is certainly a good point for the market that prices have kept so steady. Should any fresh demand arise, prices would undoubtedly respond, but until that event happens we are likely to witness a continuance of the present sagging markets.

Lighting and Power Notes.

Barking.—MAINS EXTENSIONS.—The Urban District Council Electricity Committee is to lay additional mains from Axe Street sub-station to the sewage works at a cost of £3,200.

Birmingham.—ELECTRICITY SUPPLY PROGRESS.—According to the *Birmingham Post*, the results of last year's trading of the Electric Supply Department were considered at a meeting of the Electric Supply Committee on May 29th. The accounts show a satisfactory surplus in spite of the very large increase of £97,000 in the rates and taxes charged on the undertaking during the year. Further expansion of the business was reported during the month of April, when 900 additional consumers were connected to the mains, representing upwards of 7,800 extra lamps and 3,400 h.p. in power supplies.

Bishop Monkton.—UNDERGROUND CABLES.—It was reported recently to the Ripon Rural District Council that the residents of Bishop Monkton had raised objections to the erection of overhead cables for the provision of electric lighting to the village, and that the ratepayers were willing to pay the additional cost of laying them underground. The Council accordingly has given consent for the work to be done in accordance with the wishes of the villagers.

Bognor.—EXTENSION OF SUPPLY AREA.—Work has now been commenced on the Bognor Gas and Electricity Co.'s new extension to Felpham, Middleton, Yapton and Arundel, and it is hoped that the scheme will be completed by the autumn. The e.h.p. supply is being obtained from Chichester Corporation, which in turn receives its supply from Portsmouth.

Bolton.—ELECTRICITY SUPPLY EXTENSIONS.—At a meeting of the Corporation Electricity Committee, held recently, the borough electrical engineer reported that the Electricity Department would shortly be in a position to furnish a supply of electricity from proposed overhead lines to premises in the Over Hulton district of the borough, which are now being supplied by the Lancashire Electric Power Co. It was decided that three months' notice should be given to the power company to terminate its agreements.

Bradford.—EXTENSIONS.—The Electricity Committee has recommended the erection of a transformer chamber at Frizinghall at an estimated cost of £5,151, including mains, and also the extension of services at an estimated cost of £1,578.

Chester.—LOAN.—The Electricity Committee has made application for sanction to the borrowing of £8,000 to meet the cost of carrying out extensions to underground lines in its various supply areas.

Continental.—FINLAND.—A large hydro-electric power plant has been officially opened at the Imatra Rapids, Eastern Finland. The plant now has a capacity of 81,000 h.p., but when it is completed it will have a capacity of 220,000 h.p. Electricity generated will be distributed to all parts of Southern Finland.—*Reuter* (Helsingfors).

LUXEMBURG.—The Compagnie Luxembourgeoise d'Electricité, in its report for 1928, issued recently, states that the h.p. lines have been extended by 227 miles, of which 105 miles are in the province of Namur and 122 miles in Luxemburg. Out of the 185 communes included in the concession, 90, with a population of 61,761, are now being supplied with electricity. Work is in hand to extend the system to 40 more communes during the present year, and it is expected to complete the work by the end of 1930.

GERMANY.—A power station has recently been completed by the A.E.G. at Unterelbe, Schlau, Altona. The plant has a capacity of 45,000 kW, and is estimated to have cost £585,000.

FRANCE.—La Compagnie d'Electricité de Brest has recently secured official approval to a scheme to establish a number of 15,000-V transmission lines in the Department of Finistère for the distribution of the electricity generated at the power station which is at present being established at Aber-Wrac'h to utilise the power of the tides.

AUSTRIA.—Plans have been prepared for the establishment of a new 130,000-h.p. hydro-electric power station at Korneuburg, near Vienna. The construction of the station will occupy from three to four years.

Coventry.—ASSISTED WIRING SCHEME.—The Corporation Electricity Committee has recommended the adoption of an assisted wiring scheme.

Croydon.—EXTENSIONS.—The Corporation Electricity Committee has been in negotiation with the Central Electricity Board with regard to extensions for supplying the further needs of the Corporation, and for giving additional supplies to neighbouring undertakings on behalf of the Board. Preliminary plans and estimates have been prepared for the extension of the electricity works, including one 20/25,000-kW turbo-alternator, together with condensing plant, &c., extensions to boiler house for two 100,000-lb. boilers, with all auxiliary plant, pumping machinery, cooling and coal-handling plant, and a new main switchroom, and the Committee has recommended that it be authorised to obtain tenders for the necessary plant and works. The total estimated cost is £300,500.

Dover.—LOAN SANCTIONED.—The Corporation Electricity Committee has received sanction to a loan of £3,000 for services.

Dulverton.—OVERHEAD LINES.—The Exe Valley Electricity Co., Ltd., recently informed the Rural District Council of its application to the Ministry of Transport for consent to use overhead lines for carrying out the Brampton and Dulverton Special Orders, and asked whether the Council desired to be heard in connection with the application. The line is to be operated at a pressure of 6,600 V, but, with a view to linking up ultimately with larger centres of electricity supply and extending further west, the central section has been designed for a working pressure of 33,000 V. The Council has agreed not to be heard in connection with the application.

Eastbourne.—LOANS SANCTIONED.—The Corporation Electricity Committee has received sanction to loans totalling £16,880 for mains, sub-station plant, and buildings.

Guildford.—MAINS EXTENSIONS.—The Corporation Electricity Committee has decided to extend mains, at a cost of £2,220, to supply the village of Clandon.

Glasgow.—ELECTRICITY SUPPLY.—At a meeting of the Corporation Electricity Committee held recently, a report was submitted on the position of electricity supply in the city. The Committee recommended that it should be empowered to give notice, if it so resolves, of the intention of the Corporation to terminate, on December 31st, 1929, the agreement involving the Lanarkshire County Council and the Clyde Valley Electrical Power Co., for the distribution of electricity within the area of supply authorised by the Shettleston and Tollcross Electric Lighting Order, 1926, so far as the area of supply is included in the city boundary.

SWITCHGEAR AND CABLE EXTENSIONS.—The Corporation Electricity Committee at its last meeting approved of the installation in the Byres Road and the Cadogan Street sub-stations, of additional switchgear at a cost of £2,094. Expenditure was recommended on e.h.p. transmission system extensions in Port Dundas to Byres Road, £8,616; Great Western Road, &c., for distribution and change-over purposes, £5,269; other extensions, £2,164. Under the Corporation Electricity Department's scheme 805 houses were wired in April, making the total to date 13,633. Thirty applications for the hire of appliances were dealt with during the month, making the total to date 18,546.

Haltwhistle.—OBJECTION TO ELECTRICITY ORDER.—At a recent meeting of the Rural District Council a letter was read from Messrs. Saul & Lightfoot, solicitors, of Carlisle, stating that they had lodged objections on behalf of the Council against the South-West Northumberland Electricity Order. The main objection was that the Council desired to co-operate with the Brampton District Council rather than with the Newcastle-upon-Tyne Electric Supply Co., Ltd. It was stated that a loop-line scheme for the supply of electricity was being prepared by the engineer of the Carlisle Corporation and could be made to include Haltwhistle. Under this scheme it was considered that a cheaper supply of electricity would be obtained. It was decided that full particulars should be obtained for submission at any inquiry that might be called.

Japan.—ELECTRICAL DEVELOPMENT.—The Tokio Electric Light Co. is considering the erection of a steam power station having a generating capacity of 150,000 kW. The station will be equipped with two generators, one of 50,000 kW and the other of 100,000 kW. A high-pressure steam plant will be installed.

It is stated that the Sanyo Chuo Suiden K.K. will in all probability purchase one of the two 35,000-kW turbo-generators required for the Shikama power station in England, and the other in Japan.

Kingston-on-Thames.—ADDITION TO PLANT.—The Town Council proposes to install additional plant at the electricity works, including a 3,000-kW generating set, at a cost of approximately £43,000, in order to meet the increased demand for electricity in the borough and for the estimated supply to Walton-on-Thames and Weybridge.

Leek.—INAUGURATION OF EXTENSIONS.—The extensions to the Urban District Council's electricity works were formally inaugurated by the chairman of the Electricity Committee and the chairman of the Stoke-on-Trent Electricity Committee on May 28th. Hitherto all the energy required for the district has been generated by the Council, but with the new plant installed additional supplies will be taken in bulk from Stoke-on-Trent. The additions include one 400-kW and one 200-kW rotary convertors. Electricity is supplied from Stoke by means of overhead lines at a pressure of 22,000 V a.c. to two transformers where it is reduced to 350 V. From the transformers it is conveyed to the rotary convertors and converted to d.c. 240 and 480 V for local distribution. The contractors for the extensions were Messrs. Crompton Parkinson, Ltd.

Lytham St. Annes.—EXTENSION OF SUPPLY AREA.—The supply of electricity from Lytham St. Annes to Warton and Freckleton will be available by June 14th. The Mayor will perform the ceremony of inauguration on June 18th.

Maidstone.—ELECTRICITY SUPPLY PROGRESS.—The Town Council has received sanction to a loan of £3,000 for domestic apparatus to be let out on hire. A supply of electricity is to be given to Teston and Wateringbury, at an estimated cost of £6,500, and during the summer, mains in the town are to be relaid and other work carried out at an estimated cost of £8,173. The capacity of the main to the sewerage works is to be increased at an estimated cost of £2,125, allowing electricity to be supplied to a large number of houses now being erected on the Allington estate.

Malpas.—ELECTRICITY SUPPLY.—In a recent report to the Rural District Council it was stated that the North Wales Power Co., Ltd., would have a supply of electricity available for the district towards the end of this year.

Preston.—MAINS EXTENSIONS.—The Electricity Committee has recommended the expenditure of £2,061 on extensions of mains.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

CARSHALTON.—*South Metropolitan Electric Light and Power Co.*—Lighting: From 6d. to 5½d. per kWh, the reduction to operate from the June meter readings.

WIMBLEDON.—Power: From ¾d. to ½d. per kWh. Industrial power consumers under special agreement: From ½d. to 0.4d. per kWh. The recommended reduction is to operate for the September quarter, 1929, only.

HUDDERSFIELD.—Photographers' printing arcs, &c.: At single-phase power rates. Single-phase domestic consumers: Standing charge on ratable value not to exceed £12 per annum. Doctors' and dentists' premises: Consumers to be considered as single-phase domestic consumers, and therefore to be given the option of being supplied with electricity at new scale of charge fixed on March 15th last. Three-phase power consumers: Scale of charge to be extended as follows: Over 1,000,000 kWh, 0.55d. per kWh, plus coal clause; over 2,000,000 kWh, ½d., plus coal clause. Supply to Tramways Department: Reduction of 0.1d. per kWh.

TYNEMOUTH.—Flat rate: From 5d. to 4¾d. per kWh.

Reigate.—SUPPLY OFFER ACCEPTED.—The Rural District Council has accepted the offer of the County of London Electric Supply Co., Ltd., for electricity for power at the Merstham Outfall, at 1¼d. per kWh, provided the consumption exceeds 1,250 kWh per h.p. installed per annum.

INQUIRY RESULT.—Following a recent inquiry the Ministry of Transport has informed the Rural District Council that the Minister has consented to the retention of certain overhead lines erected by the Sussex Electricity Supply Co., Ltd., in the Council's area and adjacent districts.

Sidmouth.—ELECTRICITY SUPPLY.—It was reported, at a meeting of the District Council on May 29th, that some of the transmission lines were so heavily loaded that in certain districts consumers were not receiving an adequate service. Various remedies had been under consideration, but to deal with immediate difficulties and provide for the future would involve large expenditure, and as the Electricity Commissioners refused to sanction it in view of the present transitory position of the undertaking it was decided not to connect any more consumers.

Special Order.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the Derbyshire and Nottinghamshire Electric Power Co. to supply electricity in the urban district of Bonsall and parts of the rural districts of Ashbourne, Belper Repton and Sudbury and Basford.

Stirlingshire.—STREET LIGHTING.—Final details of the scheme for the installation of electric lighting in the streets of the mining villages of Cowie, Plean and Fallin were reported at a meeting of the Central District Committee of the County Council held in Stirling recently. The electricity supply is to be provided by the Scottish Midland Electricity Supply, Ltd.

Stoke-on-Trent.—LOANS.—The Corporation Electricity Committee has obtained sanction to loans of £10,000 for general sub-station extensions, £1,535 for mains, Cannon Street area, Hanley, and £20,000 for general mains extensions. The Committee has applied for sanction to a loan of £2,500 for the erection and equipment of a sub-station in Campbell Road.

BULK SUPPLY.—The Corporation Electricity Committee has instructed the engineer to proceed with the erection of the secondary transmission lines necessary in order that a bulk supply may be given to Whitmore pumping station and the Market Drayton Electric Light & Power Co., Ltd., at a cost of £50,000.

Worksop.—NEW ELECTRICITY CHARGE.—The Electricity Committee has decided to introduce a new charge for combined domestic and business supply of £1 per kW, plus 1d. per kWh, with a minimum of 2 kW.

York.—LOANS SANCTIONED.—The Corporation Electricity Committee has obtained sanction to loans of £3,422 for sub-station buildings; £16,390 for mains; £9,935 for plant; £5,000 for transformers; and £30,000 for mains and services.

Tramway and Railway Notes.

Blackburn.—YEAR'S WORKING.—We have received from Mr. J. H. Cowell, general manager of the Corporation tramway undertaking, a copy of his annual report, together with the statement of accounts for the year ended March 31st, 1929. The total revenue is shown to be £109,469, as compared with £104,700 in the previous year. Working expenses amounted to £84,959, as against £90,148, leaving a gross surplus of £24,510 (£14,552). After payment of capital charges, contribution to permanent-way renewals fund, &c., there remained a net surplus of £13,945, as compared with a deficit of £109 in 1927-28. From the surplus a sum of £5,000 has been transferred to the borough fund. The report shows a decrease for the year in the number of passengers carried from 17,993,490 to 17,149,703, and in the car miles run from 1,174,269 to 1,147,297. The average total revenue per car mile, however, was 22.9d., as against 21.4d. for 1927-28.

Continental.—ITALY.—The steam tramway systems between Chivasso and Brusasco, and between Trofarello and Poirino, near Turin, are to be electrified. The two lines have a total length of approximately 15 miles.

RUSSIA.—The construction has commenced of a new tramway between Motovilikha and Perm. The line will probably be completed by October.—*Reuter's Trade Service* (Moscow).

Dearne Valley.—EXTENSION OF TIME.—The Dearne District Light Railways Joint Commitee has announced its intention to apply to the Ministry of Transport for a prolongation to June 24th, 1930, of the time limited for the completion of the works authorised by the Dearne District Light Railways Orders, 1915-1924.

India.—RAILWAY ELECTRIFICATION.—It is reported that the Railway Board has sanctioned the electrification of the section of the Nilgiri Mountain Railway between Coonoor and Ootacamund, a distance of 13 miles. The Board is of the opinion that the electrification of the line need not be delayed till the Pykara hydro-electric scheme has been sanctioned and that power can be obtained from the Glen Morgan scheme now in progress.—*Reuter's Trade Service* (Bombay).

Japan.—NEW ELECTRIC RAILWAY.—The Japan Electric Railway Co., Ltd., has applied for a concession to construct an electric railway between Tokio and Osaka. The distance of 298 miles between the two cities will be covered in six hours.

Wolverhampton.—RAILLESS CARS.—The last of the Corporation's routes to be converted from the tramway to the railless-car system was opened on May 27th, when members of the Corporation and representatives of neighbouring authorities were taken over the final section of the route to Darleston. The Bilston section was completed some time ago, and the final section from Bilston to Darleston represents 2½ miles of the 4½-miles route. With the completion of this system the town becomes the largest owner of railless cars in the world, with 25 miles of route. Referring to the growth of the undertaking, Councillor Alan Davies, chairman of the Transport Committee, stated that in 1918-19 the number of passengers carried was 21 millions, while in 1928-9 the total was no less than 36½ millions.

York.—FARE EXPERIMENT FAILURE.—The Tramways Committee has reported that the experiment of penny fare stages, introduced in January last, has proved a failure. The total receipts for all services—trams, railless cars, and 'buses—for the four months have fallen from £23,509 to £22,229, the number of passengers carried having dropped from 3,059,368 to

3,048,218, in spite of increased mileage. The tramway has lost about 100,000 passengers. The Committee has recommended that the penny stages be abolished and the 2d. universal fare be again brought into operation with transfer from tram to tram only, a charge of 3d. to be made for all other transfer fares.

Telegraph and Telephone Notes.

Costa Rica.—NEW RADIO STATIONS.—Congress has authorised the construction of three additional receiving stations: one at Liberia (or Guanacaste), another in the Canton of San Carlos, and a third in the province of Puntarenas. With the completion of five other wireless stations, the Republic will have twelve stations, including a small one on the Nicaraguan frontier not at present in use.—*Reuter's Trade Service* (San José).

Greece.—WIRELESS-TELEPHONY.—The Greek Minister for National Economy has tabled in the Chamber a Wireless Telephony Convention concluded with Marconi's Wireless Telegraph Co., Ltd.

Hull.—MUNICIPAL TELEPHONE SERVICE.—The finances of the Hull Corporation telephone undertaking were reported last week to be in a very satisfactory position. The manager (Mr. T. Holme) said the gross profit for the financial year amounted to £40,817, and the net profit was £14,955. The structural alterations and additions to the Central Exchange, to provide accommodation for a 4,000-line automatic exchange, were nearing completion, and the initial equipment for 1,000 lines was ready for installation. This would complete the network of main automatic exchanges required to serve the city. According to the *Yorkshire Post*, it was agreed to reduce the tariff for measured service from £6 10s. to £5 10s., and for five-party service from £4 10s. to £3 10s. per annum, flat-rate users to have the option to transfer to the new tariffs.

International Telephony.—FRANCE-GERMANY.—The results of the working of the Paris-Berlin trunk telephone in 1928 show that, in the first three months after the laying of larger through lines, the number of calls increased by more than 300 per cent.

ENGLAND-FRANCE CABLE.—Although twenty-two telephone circuits are already in operation between Paris and London, the "*Revue des Telephones, Telegraphes, et T.S.F.*" reports that the French telephone authorities, in conjunction with the British authorities, proposes to lay a new submarine cable across the Channel with the view of further increasing the telephone facilities between the two countries.

FRANCE-FINLAND.—Telephone communication has recently been established between France and Finland. The line, which is 1,870 miles in length, of which nearly 200 miles is laid in the Baltic Sea, passes *via* Berlin, Copenhagen, and Stockholm.

RUMANIA.—As part of a far-reaching programme for the improvement of communication between Rumania and other European countries, telephone calls have recently been made successfully from Bucharest to Paris and from Bucharest to Berne, Lausanne, Zurich, and Bale. Reception was good on all occasions, and the success of the experiments has aroused keen interest.—*Reuter* (Bucharest).

Marine Radio.—LONDON CONVENTION.—A convention was signed in London on May 31st by delegates of 18 nations as the result of agreement reached following discussions in committee of the International Conference on Safety of Life at Sea, which was called on the initiative of Great Britain (see ELEC. REV., April 26th, 1929, p. 768). The Conference reaffirmed that in the case of a ship carrying a large number of lifeboats one, or more, of the latter must be a motor boat fitted with a wireless installation and a searchlight.

Peru.—RADIO STATIONS.—The International Telephone and Telegraph Corporation, through its associate, All-America Cables Incorporated, has secured permission to establish wireless telephone and telegraph stations in Peru for point to point and international communication. The concession renews the company's previous rights to establish submarine cables for international telephone transmission, in addition to its present telegraph services. A condition of the concession is that all present and future lines must be capable of carrying both telephone and telegraph communication independently or simultaneously. It further binds All-America Cables to erect within two years the necessary stations for wireless telegraph communication with the United States, Spain, Argentina, Chile, and Central America, and for wireless telephone communication with Spain, with connections to other parts of Europe, and to Argentina, Chile, and the United States. The new concession considerably enlarges the International Telephone and Telegraph Corporation's activities in South America, and is a continuation of its policy of promoting world communication by telephone, telegraph, and radio.

Radio Telegraphy.—ENGLAND-BULGARIA.—A direct wireless telegraph service between Great Britain and Bulgaria was opened on May 29th.

Siam. — RADIO-TELEGRAPHY.—Prince Purachatra, Siamese Minister of Commerce and Communications, who is visiting this country on a commercial mission, was present recently at the Ongar station of the Marconi Company during experimental wireless communication to and from the Bangkok station of the Siamese Government. Transmission to Bangkok was on a wave-length of 15 metres, and return messages on one of 17 metres. According to *The Times*, Prince Purachatra said that if the King of Siam should ratify the agreement with the Marconi Company, the service would become permanent. Before coming to Britain, he visited France and Germany for the purpose of putting through practical wireless communication between Bangkok and the stations of Radio France and the Trans-Radio Company of Germany. The agreement with Germany had been signed for some time, but that with France was not yet signed. Though it was not yet possible for the Marconi Co. to arrange for direct wireless-telephone communications between this country and Bangkok, he had sent a good many wireless telephone messages to Bangkok through the French and German stations. He could, in fact, speak from the Siamese Legation in London, *via* Paris or Berlin, to Bangkok.

The radio-telegraph service between England and Siam was inaugurated on June 1st, the ordinary rate being 1s. 11d. per word.

The Telephone Service.—MANX CABLE.—The cable ship *Faraday*, owned by Messrs. Siemens Bros., arrived at the Isle of Man on May 31st with over 2,000 tons of submarine telephone cable to be laid from Norbreck, near Blackpool, to Port Grenaugh, Isle of Man, and from Port Erin, Isle of Man, to Ballyhoman, Ireland. The vessel left the island the same day to mark out the course with gas buoys.

United States.—CABLE-WIRELESS FUSION.—General J. G. Harbord, president of the Radio Corporation of America, has stated in a newspaper that the recent successful effort of British companies to consolidate their cable and wireless interests is a serious challenge to the wireless supremacy of the United States, which is more important to the United States than oil, or the merchant marine. He points out the importance of communication, particularly wireless, to world-wide commerce, and also national defence, especially in the case of countries having distant possessions. American trade in every quarter of the globe, he writes, cannot but be profoundly affected. Owing to American distrust of a monopoly, while Great Britain, France, Italy, and Germany are each uniting their cable and wireless services, America is endeavouring to keep them apart, and he quotes as an example the White Act of 1927, which forbids the purchase of a wireless company by a cable company, and *vice-versa*. General Harbord explains that his statements are intended to indicate the attitude of the American Government, which should be altered. The alternative is to surrender and acquiesce in the leadership of communications by Great Britain.

The Senatorial inquiry into the radio, telephone, and telegraph monopolies will begin this week.

Radio Notes.

Argentina.—GOVERNMENT DECREE. — According to the monthly journal of the British Chamber of Commerce in the Argentine Republic, a decree was recently issued governing the future operation of broadcasting services and the use of transmitting apparatus for experimental, research, and other purposes. One of the provisions is that the broadcasting stations must within a period of nine months be removed beyond the limits of the city and its immediate environs. General provisions aim at the improvement of the services, the limitation of the use of them for advertising purposes, and the attainment of higher standards of artistic merit in the entertainment provided. During the next twelve months extensive renovation of broadcasting installations, apparatus, and materials will probably be undertaken, and it is hoped that in the event of any resultant improvement in the quality of the services the public demand for radio apparatus and equipment will be enlivened. The imports of such equipment more than doubled between 1926 and 1927, but the tendency suffered a check in 1928, and there is reason to believe that before any further rapid expansion of business can be expected the improvement in the artistic merit of the broadcasting services at which the Presidential Decree unquestionably aims will have to be proved. At present a large proportion of the users of radio pertain to the class of "fans," and it is for this reason that the sale of parts has represented a far greater turnover than the sale of complete sets. The market for high-class complete sets will come into its own when the service has been raised to a reasonably high standard, and the effects of the Decree should be watched by British manufacturers of high-class complete sets whose apparatus would be suitable for the trade, which has thus far been held in check by the defects of the services.

Australia.—TENDERS FOR BROADCASTING.—At the end of April the Commonwealth Government called for tenders for the supply of broadcasting programmes under the control of the Postal Department, covering the whole of Australia. Instead of specifying the type required and inviting competitive prices, a fixed amount will be set aside from each listener's licence fee to be paid to the suppliers, and tenderers were asked to state in detail what standard of programme they would be prepared to supply for the percentage of the licence fee, says *World-Radio*. The Government may reduce the amount paid to the successful tenderer per licence in the event of any falling off in quality. The Federal Government considers that £150,000 a year is the maximum which it will be able to spend on programmes, which is about the amount now spent in Sydney and Melbourne alone. Already (6WF) Perth, the only A-class station in West Australia, has been taken over by the Government, although it will not be ready to take over any of the others until January next.

France.—GOVERNMENT BILL.—A Bill regulating and reorganising the broadcasting services in France was signed by the President of the Republic on May 28th.

Germany.—SHORT-WAVE STATIONS.—There are four short-wave stations in Germany, but transmission takes place on 13 wave-lengths as follows: Döberitz (AFK), 175.6, 105, 67.6, 45.3, 43.1, 37.8 metres. Bergedorf (AFL), 75, 70, 52 metres. Nauen (AGE), 56, 17.2, 14.85 metres. Königswusterhausen (no call sign is used at present), 75.3 metres. Similarly to Nauen, the last-named Weltrundfunksender is rated at 20 kW, about 7 kW aerial energy; it is still experimental, and the only short-wave plant that transmits telephony exclusively, and it is shortly to begin the use of a wave-length between 15 and 50 metres. It is assumed that now Nauen is being used for transcontinental telephony it will not be available to amateurs much longer.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—July 15th. State Electricity Commission of Victoria. Two 750-kVA transformers and spares. (B.X. 5325.)*

July 23rd. Posts and Telegraphs Department. Telegraph instruments. (B.X. 5323.)*

Belfast.—June 17th. Electricity Department. Manufacture, supply and delivery of h.p. combined cubicle and truck type switchgear and transformer kiosks, and the manufacture, supply, delivery and erection of one 1,000-kW rotary convertor, one 500-kW rotary convertor, d.c. switchgear, h.p. armourclad switchgear, and h.p. truck-type switchgear for sub-stations. (May 31st.)

Canada.—TORONTO.—Hydro-Electric Commission. Unwiped galvanised 7-strand steel cables. (A.X. 8005.)*

Cheadle and Gatley.—June 11th. Electricity Department. Overhead distribution scheme (Contract No. 47), two e.h.p. truck cubicles (Contract No. 50). Specifications (deposit £1 1s. each) and drawings from Mr. R. W. Willis, 37, High Street, Cheadle.

Colwyn Bay.—June 14th. Electricity Department. Supply, laying and jointing of e.h.p. and l.p. cables. (May 31st.)

Dartford.—June 11th. Urban District Council. Supply of 1,815 yd. of 3-core, paper-insulated, l.c. and armoured cable, suitable for a working pressure of 660 V. (See this issue.)

Dumbarton.—The Education Authority is inviting tenders for electrical work for the new Primary and Secondary School at Kirkintilloch. Mr. R. W. Roxburgh, clerk and treasurer of Authority, 18, Park Circus, Glasgow.

East Grinstead.—June 17th. Electricity Department. Supply, laying and jointing of a system of l.p. cables, complete and ready for use. (May 31st.)

East Ham.—June 12th. Education Committee. Installation of electric lighting at Salisbury School. Specification 10s., from Mr. F. H. Thompson, secretary, Town Hall, East Ham.

Edinburgh.—June 17th. Education Committee. Electrical installations at Colinton, Davidson's Mains, Gilmerton, Granton, Juniper Green, Willowbrae, and Milton House Schools. Specifications, &c., from Executive Officer, Education Offices, Castle Terrace, Edinburgh.

Egypt.—CAIRO.—August 13th. Ministry of the Interior. Supply of an electric power station with underground and overhead network for the town of Maghagha. (B.X. 5318.)*

Farnworth.—June 15th. Electricity Department. Supply of l.p. cables. (May 31st.)

Hull.—June 20th. Electricity Department. Supply of stores for 12 months from July 1st, 1929. (See this issue.)

Leeds.—June 17th. Education Committee. Electrical wiring of schools during midsummer vacation. Particulars from Education Offices (architect's section), Calverley Street, Leeds.

London.—CENTRAL ELECTRICITY BOARD.—June 17th. Supply, delivery and erection of 33-kV and lower voltage switchgear for the North-West England and North Wales Electricity Scheme, 1928. (May 17th.)

July 22nd. Supply, delivery and erection of central indicators and telephones for the Central Scotland Electricity Scheme, 1927. (See this issue.)

METROPOLITAN ASYLUMS BOARD.—June 12th. Installation of two electric passenger lifts at Colindale Hospital, fire-alarm system at High Wood Hospital, and electric bell system at Wandsworth casual ward. (May 24th.)

CENTRAL LONDON SCHOOL DISTRICT, HANWELL.—June 8th. Four motors, switchgear equipment, steel shafting, leather belting, &c. (May 24th.)

LONDON COUNTY COUNCIL.—July 8th. 150 complete bodies for tramcars, 150 sets of swing bolster bogie trucks, 150 electrical equipments for tramcars, &c., and 150 magnetic track and wheel brake equipments. (See this issue.)

Newport (Mon.).—June 22nd. Electricity Department. One 1,250-kW motor convertor and switchgear. (See this issue.)

New Zealand.—WELLINGTON.—August 7th. Posts and Telegraph Department. Enamelled and silk-covered resistance wire. (B.X. 5322.)

August 13th. Public Works Department. Water turbine-driven generating sets and switchgear for Waitaki. (B.X. 5278.)*

September 4th. Government Railways. Motor generator. (B.X. 5308.)*

AUCKLAND.—August 19th. Auckland Electric Power Board. Single-phase transformers. (B.X. 5324.)*

Nottingham.—June 28th. Electricity Department. Supply of general stores for the electricity undertaking for 12 months from July 1st, 1929. (See this issue.)

South Africa.—PRETORIA.—June 27th. Posts and Telegraphs Department. Automatic wall and table-pattern telephones. (B.X. 5273.)*

PIETERSBURG, TRANSVAAL.—August 13th. Municipal Council. Steam-raising plant, engine alternators, and switchgear. (A.X. 7983.)*

August 13th. H. and l.p. cable, lamps and sundries. (B.X. 5312.)*

JOHANNESBURG.—June 27th. South African Railways and Harbours. 2,200- and 600-V cables and accessories. (B.X. 5343.)*

June 20th. City Council. Supply and delivery of h.p. and l.p. cables. (B.X. 5342.)

Spain.—BILBAO.—Juntas de Obras (Boards of Works). Ten electric cranes.—*Reuter's Trade Service* (Madrid).

Stafford.—July 2nd. Staffordshire Education Committee. Installation of electric light at Kingswinford Brockmoor Council school. (See this issue.)

Stockton-on-Tees.—June 11th. Electricity Department. Supply and delivery of two 1,250-kVA 3-phase transformers and l.p. 3-phase switchgear. (May 24th.)

Sunderland.—July 8th. Electricity Department. Paper-insulated, lead-sheathed cable, rubber-insulated wire, meters, gasfilled and vacuum lamps. (See this issue.)

Uruguay.—PORT AUTHORITIES.—July 22nd. 300-kilo electro pneumatic drop-hammer. (A.X. 7974.)*

Walthamstow.—June 12th. Electricity Department. Supply, delivery and erection of two cooling towers and one ferro-concrete tank. (May 24th.)

West Ham.—June 17th. Education Committee. Installation of electric lighting at Fyfield open-air school extension, and installation of water-heating apparatus at Balaam Street School, Plaistow. (May 24th.)

Wolverhampton.—July 10th. West Midlands Joint Electricity Authority. Three 225,000-lb. boilers with economisers, air heaters, fans, &c. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Australia.—SYDNEY.—City Commission. Accepted :—
Power transformers (£45,772).—Electrical Plant Manufacturers, Ltd.
MELBOURNE.—State Electricity Commission. Accepted :—
360 miles of aluminium cable for Yallourn-Richmond main transmission line (£67,432).—British Insulated Cables, Ltd.

Barking Town.—Electricity Committee. Recommended :—
Two 400-kVA transformers.

HACKBRIDGE ELECTRIC CONSTRUCTION CO., LTD. (Recommended.)	£179 each.
Johnson & Phillips, Ltd.	204 ,,
Crompton Parkinson, Ltd.	205 ,,
Brush Electrical Engineering Co., Ltd. ...	208 ,,
Ferranti, Ltd.	217 ,,
British Electric Transformer Co., Ltd. ...	220 ,,
English Electric Co., Ltd.	220 ,,

Birmingham.—Water Committee. Accepted :—
Installation of apparatus for electric lighting at Edgbaston pumping station.—Baxter & Impey.
The Corporation has accepted the following tenders during the last three months :—
Electric lighting installations at Bierton Road junior school and Arden Road school.—Reynolds & Bradwell; at George Dixon school.—T. Glover; at City Fever Hospital.—L. Scrutton.
Two electric vehicle batteries.—Tudor Accumulator Co., Ltd.
Electricity Committee. Accepted :—
Rotary convertors for Summer Lane generating station and three sub-stations.—Electric Construction Co., Ltd.
Rotary-convertor equipment at two sub-stations.—General Electric Co., Ltd.

Chesterfield.—Town Council. Accepted :—
Transformer and switchgear in connection with work at Whispering Well (£275).—English Electric Co., Ltd.

Croydon.—Town Council. Accepted :—
Concrete cooling tower in connection with the extensions (£18,680).—Purdie, Lumsden & Co., Ltd.
Pipe work for the tower (£5,352).—Aiton & Co., Ltd.

Glasgow.—Halls Sub-Committee. Recommended :—
Main switchboard at M'Lellan Galleries (£130).—Anderson & Munro, Ltd.
Electricity Committee. Recommended :—
Materials for 12 months :—
Single cables.—Enfield Cable Works, Ltd.
Telephone cables.—Callender's Cable and Construction Co., Ltd.
L.p. cables.—W. T. Glover & Co., Ltd.; Enfield Cable Works, Ltd.; Callender's Cable and Construction Co., Ltd.
E.h.p. cables.—Callender's Cable and Construction Co., Ltd.; W. T. Glover & Co., Ltd.
R.i. cables.—Craigpark Electric Cable Co., Ltd.; Edison Swan Electric Co., Ltd.
Flexibles.—Craigpark Electric Cable Co., Ltd.
D.c. meters.—Chamberlain & Hookham, Ltd.; Ferranti, Ltd.
A.c. meters.—Metropolitan-Vickers Electrical Co., Ltd.; Edison Swan Electric Co., Ltd.; Ferranti, Ltd.; Electrical Apparatus Co., Ltd.; Chamberlain & Hookham, Ltd.
Arc lamp carbons.—General Electric Co., Ltd.
Electric cookers.—Siemens Electric Lamps and Supplies, Ltd.; Falkirk Iron Co., Ltd.
Electric kettles.—Bulpitt & Sons, Ltd.
Cast-iron boxes, section pilars, &c.—James Allan, Senr., and Son, Ltd.; Carron Company; Falkirk Iron Co., Ltd.; David King & Sons, Ltd.; Lane & Girvan; John Needham & Sons; M'Dowall, Steven & Co.; Robert Taylor & Co.
Two 20,000-V feeder panels at Cadogan Street sub-station (£1,328).—A. Reyrolle & Co., Ltd.
75 electric cookers.—Siemens Electric Lamps and Supplies, Ltd. (Accepted.)
Cleansing Committee. Recommended :—
Utility electric truck for Govan refuse works (£233).—Electric Vehicles, Ltd.
Six electric vehicles (£1,098 each).—Richard Garrett and Sons, Ltd.
Lighting Committee. Accepted :—
Electrical fittings and accessories for 12 months.—W. McGeoch & Co., Ltd.; Cartwright & Sons; Brown and Co.; Z Electric Lamp and Supplies Co., Ltd.; Sloan Electrical Co., Ltd.; Malcolm & Allan, Ltd.; T. Land & Sons; Bayliss, March & Newey, Ltd.; Credenda Conduits Co., Ltd.

Hornsey.—Electricity Committee. Recommended :—
300-kW rectifier set (£2,460).—Hewittic Electric Co., Ltd.
L.p. switchgear (£1,073).—Bertram Thomas & Co.
H.p. switch panel (£317); h.p. switchgear (£1,405).—A. Reyrolle & Co., Ltd.
H.p. and control cables (£2,712).—Standard Telephones and Cables, Ltd.
300-kW motor convertor (£1,887).—Bruce Peebles and Co., Ltd.
Education Committee. Recommended :—
Additional installation of electricity at Highgate school (£356).—A. E. Sandilands.

Ilford.—Electricity Committee. Recommended :—
Cables.—Metropolitan Electric Cable Construction Co., Ltd., and Union Cable Co., Ltd.

Leicester.—Electricity Committee. Accepted :—
Steam pipe connections for central power station (£1,708).—Aiton & Co., Ltd.

Leyton.—Town Council. Accepted :—
Consumers' motors in connection with the change-over.—Crompton Parkinson, Ltd.

Liverpool.—Electricity Committee.
50,000-kW turbo-alternator for Clarence Dock power station (£193,370).—Metropolitan-Vickers Electrical Co., Ltd.

London.—STEPNEY.—Electricity Supply Committee.
Air compressor (£97).—Reavell & Co., Ltd.
Two tons plumbers' solder (£148).—H. B. Barnard & Sons.
Four 1,500-kW motor convertors and switchgear for sub-stations :—

Ateliers de Constructions Electriques de Charleroi	£19,600
BRITISH THOMSON-HOUSTON CO., LTD. (Recommended.)	19,934
Metropolitan-Vickers Electrical Co., Ltd. ...	19,963
Bruce Peebles & Co., Ltd.	20,204
General Electric Co., Ltd.	20,236
English Electric Co., Ltd.	20,305

LONDON COUNTY COUNCIL.—Accepted :—
V.i.r. cables.—British Driver-Harris Co., Ltd.
POPLAR.—Electricity Committee. Recommended :—
Cables (£738).—Siemens Bros. & Co., Ltd.
Circulating water pumping machinery (£2,230).—Mirrlees-Watson Co., Ltd.

Richmond (Surrey).—Board of Guardians. Rewiring work at the Grove Road Institution :—
RICHMOND ELECTRIC INSTALLATIONS (accepted), £850 and £795.
Telephone and Electric Maintenance Co., £1,590 and £1,700.
Troy & Co., £791 and £759.
Stone & Co., £784 and £744.
Tredegars, Ltd., £1,014 and £910.
J. Passmoor, £881 and £838.
Howson, Jones & Co., £750 and £680.
Richmond Electric Light Co., £1,090 and £1,150.
Messrs. Clark, £1,341 and £1,248.
General Electric and Maintenance Co., £1,985 and £1,817.
Messrs. Higginbothams, £1,150 and £1,150.
Langston-Jones & Co., £929 and £849.
Skase & Co., £3,250 and £2,850.
Burdett & Co., £925 and £850.
Messrs. Vigor, £998 and £1,030.
Carr Bros., £553 and £454.
An amendment to accept the tender of Carr Bros. as the lowest was rejected by nine votes to six.

Salford.—Electricity Committee. Recommended :—
1,170 yards of single-core cables (£627).—W. T. Glover and Co., Ltd.
E.h.p. switchgear for Cromwell Road sub-station (£536).—Metropolitan-Vickers Electrical Co., Ltd.
Three-phase oil-immersed power transformers for 12 months.—Hackbridge Electric Construction Co., Ltd.
Electric thermal storage system at Frederick Road power station (£995).—Saunders & Taylor, Ltd.

Smethwick.—Estates Committee. Accepted :—
Electric light installation at Mallin Street Baths.—Walker and Co.

South Africa.—CAPE TOWN.—Electricity Committee. Recommended :—
Transformers.—Three 1,000-kVA (£1,776), Bruce Peebles and Co., Ltd.; ten 300-kVA (£2,060), seven 150-kVA (£952), eight 100-kVA (£776), Reunert & Lenz, Ltd.; five single-phase (£1,450), Metropolitan-Vickers Electrical Export Co., Ltd.; two 300-kVA (£410), and two 150-kVA (£240), Dowson & Dobson, Ltd.; two 300-kVA (£438), and two 150-kVA (£290), South African General Electric Co., Ltd.

Fuses.—250 of 350 amps. capacity, and 50 pairs of spare contacts (£369).—Albert Vaux, Ltd.
100 fuse handles (£125).—Saaler & Franks, Ltd.
Spares for boilers (£494).—Reunert & Lenz, Ltd.

Stoke-on-Trent.—Electricity Committee. Accepted:—
1,000-kVA transformers (£570 each).—Metropolitan-Vickers Electrical Co., Ltd.
Overhead wiring and services for new houses on various estates:—Sutton estate (£189) and Eaton Street (£44).—Barnett & Soans. Cornhill estate (£302).—H. Parker; and (£360).—E. Holloway. Hanford estate (£176).—H. Parker; and (£230).—Tomlins, Ltd.

Wrexham.—Town Council. Accepted:—
Wiring 36 houses at Hightown for electric light (£297).—Jones & Williams.

York.—Electricity Committee. Recommended:—
Switchgear for Foss Island works (£1,361) and for Lendal sub-station (£1,220).—A. Reyrolle & Co., Ltd.
Switchgear for Kent Street sub-station (£768); Scarborough Bridge (£634); the Groves (£422); Burton Lane (£320); and South Bank (£324).—George Ellison, Ltd.

Forthcoming Events.

E.H.P. Conference.—Paris. June 6th to 15th. Institution of Electrical Engineers. Summer meeting in France, June 11th to 22nd.

Electrical Association for Women.—June 10th-12th. Newcastle-upon-Tyne. Conference and annual meeting.

Electric Lamp Manufacturers of Great Britain.—June 10th to 14th. Nineteenth Illumination Design Course. E.L.M.A. Lighting Service Bureau. 9.45 a.m. daily.

Institution of Electrical Engineers.—Summer meeting in France. June 11th to 22nd.

Diesel Engine Users' Association.—Friday, June 14th. Caxton Hall, S.W. 6 p.m. "Repairs to Diesel Engine Parts by Electro-deposition." Mr. C. H. Faris.

Electrical Contractors' Association.—June 26th to 28th. Bournemouth. Annual conference.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—

CHAPPUIS reflectors.

Notes.

A Small Automatic Hydro-electric Plant.

Some interesting particulars are given in the "Brown-Boveri Review" of the new reserve power station which was built last year by the Buchs Municipal Water and Electricity Supply (Switzerland), to utilise the available head of water below the existing power station. The new plant contains one 900-h.p. hydro-electric generator, and is equipped for automatic control. In addition, the operation of the old power station has been simplified, so that after the new unit, which works alone during the day, has been started up, the attendant has merely to be present when required.

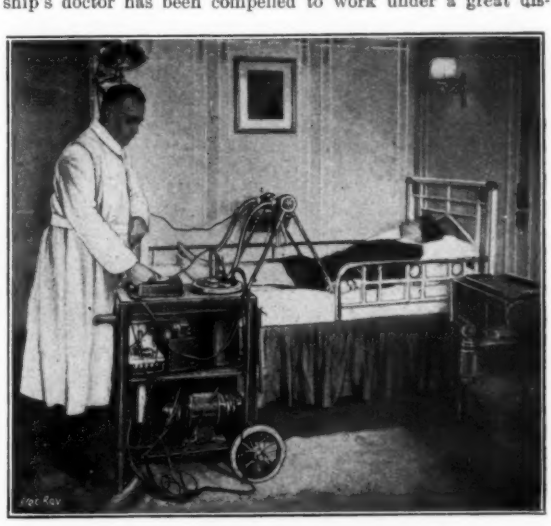
The three-phase alternator, which develops 920 kVA, is of the protected type and self-cooled, air being drawn in from the machine room by means of vanes bolted to the rotor. A directly-coupled exciter is mounted on a bracket secured to the bearing at the non-driving end. Regulation poles are provided, enabling the alternator pressure to be varied within wide limits by means of the rheostat in the exciter shunt-field circuit. The turbine governor has an auxiliary hydraulic servomotor for preventing the turbine from running away if the oil-pressure governing it should fail. The speed can be varied within wide limits from the main power station by means of an electrical speed-adjusting gear. The water supply to the turbine is regulated by a hydraulically-operated sluice valve controlled by means of an electromagnet.

In addition to the usual equipment for controlling the turbo-alternator set, there are also provided thermostats built into the various bearings, and a contact manometer on the servomotor. If the oil pressure falls in the regulating system, the manometer trips the oil circuit breaker and notifies the attendant. To ensure reliability in tripping the set under all circumstances, the free end of the turbine shaft is coupled to a small auxiliary dynamo which generates current all the time the turbine is running, for the purpose of tripping the set if necessary. A second winding on the electro-magnet for operating the sluice valve is fed from this auxiliary dynamo.

The switchboard for the new alternator is situated in the old station near the other switchboard; it is completely enclosed by sheet iron, the connections to the existing bus-bars being brought out through three bushing insulators. The 920-kVA set is paralleled on to the mains by means of an existing synchronising apparatus in the old power station. Disturbances are signalled by special apparatus. The set is started up by means of a push-button switch with a holding coil; the current which passes through this coil also passing through the coil of an indicator disk. Thus, when starting up, this disk closes a contact and prepares the signalling circuit for closing. If a disturbance causes a relay to interrupt the retaining current, the push-button switch opens and then closes another contact in series with the one on the indicator disk and causes the alarm bell to ring. The attendant, being notified, can now raise the indicator disk again, thus stopping the bell. If an excess of current causes the set to be tripped, the alarm is given by a special indicator disk.

X-rays at Sea.

One of the most important aids for the doctor aboard ship has not been available hitherto, for purely technical reasons. We refer to X-ray apparatus, without which the surgeon is severely handicapped. Breakages of limbs occur all too frequently on the big passenger liners, and in these cases the ship's doctor has been compelled to work under a great disadvantage for want of X-ray pictures. Until recently, owing to its cumbersome nature, X-ray plant was entirely unsuitable for use at sea, as, in addition to the problem of space, the deleterious action of sea air on the more delicate portions of the apparatus had to be considered, whilst the operation of such an installation would have necessitated the employment of a qualified operator. All these difficulties are claimed to have been overcome however by the introduction of a portable outfit of entirely new design, known as Philips "Metalix-Portable." With this apparatus, the ship's surgeon is enabled to make his own X-ray diagnosis, and the accompanying illustration shows the apparatus in use in a passenger's cabin aboard the liner *Belgenland*, owned by the Red Star Line, which is one of the first companies to take advantage of the innovation. A trolley table carries the entire outfit, and accommodates a small rotary convertor which supplies the necessary alternating current to the apparatus from the ship's electricity supply mains. The outfit is provided with a metal-clad X-ray tube mounted on adjustable legs, by which means it can be accurately centred over the patient, the high-voltage current being fed through two specially insulated shockproof cables. Whilst in operation the outfit can be handled with safety. The patient experiences no sensation, and nothing to indicate that a pressure of some 65,000 volts is being generated within such a small compass. The apparatus is totally enclosed, and requires no special knowledge to operate.



Ship's "Metalix" X-ray Outfit.

The March Railway Yard.

According to the *Morning Post*, March, "the Metropolis of the Fens," has been provided with one of the finest railway marshalling yards in the world. The work, which has been carried out on an elaborate scale, has just been completed at a cost of over £300,000. The new yard is capable of dealing with an additional 1,000 wagons per day, and some 40 additional men have been engaged to man the sidings and work the train service. Electricity plays an important part; not only is the "yard" illuminated by flood lights, but the marshalling sidings are electrically operated, and the points are controlled by one man in an electric control cabin.

The Electrical Association for Women.

On May 25th members of the Electrical Association for Women had the pleasure of visiting the new power station at Longford, near Coventry. The members thoroughly enjoyed the visit, especially the journey up into the inside of the cooling tower, which was worth every effort needed to reach that point.

A very successful lecture-demonstration was given by Mrs. H. L. Dover, B.Sc.(Lond.), a member of the E.A.W., at the latter's premises at Kensington Court on May 29th. A model thermal-storage electric cooker had been sent from Sweden by arrangement with Mr. R. Borlase Matthews and Dr. A. Ekstrom, and Mrs. Dover's lecture was the result of tests made on the cooker in her own home under ordinary home conditions. Although the consumption of electricity per person was higher than with an ordinary electric cooker, there were very decided advantages, such as a hot-plate always available which would boil much more rapidly than the ordinary hot plate. There were also the further advantages that inferior types of food could be cooked and made just as palatable as the more expensive ones, and the cooker could be plugged into an ordinary outlet. A good discussion followed, in which members of the Women's Co-operative Guild present stated that such forms of cooking would be of benefit to the working woman.

132-kV Switchgear for Central Scotland.

In the accompanying illustration is shown a special train prior to its departure from Willesden for Bonnybridge with the oil tanks and component parts for the last three B.T.H. 132,000-volt outdoor oil-immersed circuit breakers for the first sub-station of the eastern ring of the Central Scotland section of the "grid." As is generally known, the contract for the 132,000-volt switchgear for the eastern portion of this scheme was placed by the Central Electricity Board with the British Thomson-Houston Co., Ltd. All the sub-stations are of the outdoor type, and the principal groups of the switchgear are 45 oil-immersed circuit breakers, each of three single-phase units. Each unit is over 8 feet high to the top of the tank, and about 15 feet to the top of the terminals. A 3-phase group, complete with oil, weighs about 25 tons (see ELEC. REV., May 17th, 1929, p. 871).

A Train of 132-kV B.T.H. Switchgear for Scotland.

B.E.S.A. Publications.

Three electrical specifications have recently been issued by the British Engineering Standards Association. Two are revisions, No. 37—1929, Electricity Meters, and 67—1929, Two- and Three-plate Ceiling Roses, while the third publication is No. 358—1929, British Standard Rules for the Measurement of Voltage with Sphere-gaps. B.S.S. No. 37 is a revision of the 1919 edition, and differs from its predecessor in several important respects. In the first place, the permissible limits of error have been appreciably reduced, the limits for all sizes, grades and types of meters now being within the Board of Trade limits. In the second place, differentiation has been made in several important respects between d.c. and a.c. meters, whereas in the 1919 edition there was no differentiation as regards the majority of the electrical performance requirements. Thirdly, two grades of both a.c. and d.c. types are provided for, namely, a sub-standard grade and a commercial grade. Fourthly, the registering mechanism is now restricted to the pointer type, and must consist of not less than six pointers. A very useful feature of the specification is a folding sheet containing a summary of the performance requirements. This sheet can be removed from the specification and mounted in the test-room for ready reference.

B.S.S. 67, the revision of the 1914 edition, differs from the old specification mainly in that the design has been simplified by the omission of the projecting lugs on the contact-plates, and by the contact-plates of the three-plate ceiling rose not being required to be of different shapes. In addition to the two- and three-plate surface-type ceiling roses, provision is made in the revised edition for semi-recessed ceiling roses, all types being suitable for use in circuits in which the pressure does not exceed 250 volts, and the current does not exceed 5 A. The specification lays down the materials and dimensions of the component parts, and details are given of a suitable gauge to ensure that the holes for the fixing screws are so spaced that a British Standard ceiling rose can be mounted on a British Standard conduit box. It is interesting to note that whereas the old specification restricted the material of the base and cover to "vitreous material," the revision allows the alternative use of "tough non-ignitable insulating material" (mouldings), provided such materials satisfy the requirements of the specification.

B.S.S. No. 358 is a publication as a British Standard of the rules prepared by the British Electrical and Allied Industries Research Association, and is a revision and extension of the material originally presented by the B.E.A.I.R.A. in Technical Report No. L/S2. These new rules supersede the old rules which were given as appendices to several of the British Standard Specifications for electrical machinery. The tables given therein have been approved by the International Electrotechnical Commission, and they cover the whole range of voltages from 10 kV to 900 kV, with six sizes of spheres. In addition to the tables, a series of curves are included to enable interpolations to be made at any intermediate point, with an accuracy equal to the limiting accuracy of the method itself.

Copies of all the new specifications may be obtained, price 2s. 2d. each, post free, from the Publication Department, British Engineering Standards Association, 28, Victoria Street, London, S.W.1.

Appointments Vacant.

Full-time lecturer of electrical engineering at Leicester College of Technology. Maintenance engineer and three junior assistant charge engineers for Bristol Corporation. Switchboard attendant and meter tester for Walthamstow Urban District Council. Meter superintendent and meter repairer for Hull Corporation. Shift charge engineer at Willesden power station, and assistant charge engineer at Brimsdown power station for the North Metropolitan Electric Power Supply Co. Plumber-jointer (e.h.p.) and jointer (l.p.) for Watford Corporation. Assistant charge or relief engineer for Islington Borough Council. (See our advertisement pages to-day.)

Power Stations in London.

With regard to the correspondence which has passed between Mr. W. Townend, town clerk, Fulham, and Mr. W. Tapper, president, Royal Institute of British Architects, and published in the daily Press, we have been asked to draw attention to the town clerk's protest that the president's statement relative to the injury which the discharge of products of combustion may do to the surrounding neighbourhood, &c., is false in so far as it concerns "the existing station at Fulham," and is denied. The president, in reply, explained that the station referred to by him was not that of the Council, and he regretted that any idea that he meant that station should have arisen.

I.E.E. Golf Competition.

The golf competition in aid of the I.E.E. Benevolent Fund was played at the Hesketh Golf Club, Southport, on May 29th. Fine weather prevailed and some very good cards were returned. The G. P. Dennis Trophy was won by Mr. A. G. Barnard (Liverpool), with a net score of 1 down. Mr. J. O. Balshaw and Mr. F. G. Briant tied for second place with a score of 2 down. In the first division Mr. J. O. Balshaw and Mr. A. G. Barnard tied for first place with a net score of 75, and in the second division Mr. H. Gawthorne returned the best card with a score of 80. In the two-ball foursome the best card was returned by Mrs. Kessler and Mr. W. A. Phillips with a net score of 80½, and for the second best card Mr. F. E. Boot and Mr. F. G. Briant tied with Mr. R. Foster and Mr. R. Turnbull with a score of 81. The putting competition was won by Mr. G. S. King. The total entry was 75, of which 53 took out cards for the various competitions. Mr. S. E. Britton, chairman of the Mersey and North Wales (Liverpool) Centre, presided at the dinner and was supported by Mr. J. Harcourt Williams, chairman of the North-Western Centre. The dinner was held at the Prince of Wales Hotel, Southport, and the prizes were presented by Mrs. J. Harcourt Williams. The event this year was organised as a joint effort with the North-Western Centre and it is hoped that a substantial amount will be handed over to the Benevolent Fund of the I.E.E.

Brighton Students and Electro-Farming.

When students from the Brighton Technical College recently visited the "all-electric" farm of Mr. R. Borlase Matthews, near East Grinstead, the afternoon was so hot that one of the most attractive items of the visit was a walk by the side of Wiremill Lake to the hydro-electric power station. At the top of the lake, where water lilies are now grown for the London market, a water wheel was operated in the times of the Romans, as well as in the days of the Sussex iron workers. To-day power from the lake is being utilised for all the farm purposes to which electricity can be applied, and an unusual feature of the station is that its controls are over a mile away across the fields, near the main farm buildings, where there is also an oil engine as a stand-by. During the past drought the latter has been specially useful at a time of year when all the house and cottage dwellers on the estate become big consumers. The visitors were particularly interested in the erection of a new power line to some new buildings. The supports for the cable are of the X-pole type, about which Mr. R. Borlase Matthews is shortly reading a paper before the International Extra-High-Pressure Conference in Paris. The low cost of these poles, as compared with those of more conventional designs, makes them well worthy of consideration at a time when any contribution towards reducing the cost of electrical distribution is of national importance.

The British Association.

It is announced that the centenary meeting of the British Association for the Advancement of Science in 1932 will be held at York, the city in which the Association was founded.

Educational.

CLIFTON COLLEGE.—Owing to the large increase of the number of visitors who intend to be present at the Guthrie and Percival Commemoration celebrations on June 28th and 29th, it has been found necessary to restrict admission to certain functions to ticket holders only. Old Cliftonians are therefore advised to apply for tickets not later than June 15th.

Full-time courses are provided in engineering, including electrical engineering and electrical communication, at the Northampton Polytechnic Institute, St. John Street, E.C.1. (See our advertisement pages to-day.)

Institution Notes.

Institution of Electrical Engineers.

The Council has nominated the undernamed gentlemen to fill the vacancies which will occur on September 30th, 1929:—*President*, Col. Sir T. F. Purves, engineer-in-chief, General Post Office; *hon. treasurer*, Mr. E. Leete, London Electric Wire Co. & Smiths, Ltd.; *new members of Council*, Messrs. A. R. Cooper, London Electric Railway Co.; R. S. Whipple, Cambridge Instrument Co., Ltd.; Prof. E. Wilson, King's College, London; Mr. E. E. Sharp, Venner Time Switches, Ltd.

NORTH-MIDLAND CENTRE SUMMER OUTING.—The committee of the N.M. Centre (Leeds), in conjunction with the Sheffield Sub-Centre, proposes that a summer outing be arranged for the whole Centre this year, on Saturday and Sunday, June 29th and 30th, and the place selected is the Palace Hotel, Buxton. Luncheon will be served at the hotel on the Saturday, and during the afternoon various trips, golf, or tennis, can be arranged; after dinner there will be dancing at the hotel. On the Sunday there will be excursions, or golf, during the morning and luncheon at the hotel. It is hoped to inaugurate this outing as an annual social function, and ladies are particularly invited. The committee of the Sheffield Sub-Centre will be responsible for the final arrangements.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

We feel compelled to lead off our "Personal" column this week by recording for the benefit of our readers—so many of whom are doubtless as keen golfers as they are engineers—the latest feat of Mr. P. N. RAND, the general sales manager of the English Electric Co., Ltd. Playing at Bramley, Surrey, last week, his shot from the fifteenth tee struck the pin squarely about four inches from the ground and the ball dropped into the hole. The fifteenth is a 120-yards blind hole with a bogey of 3.

The General Election.—The "electrical and allied" representation in the House of Commons remains much as it was before the general election. The following Conservatives retained their seats:—Sir PHILIP DAWSON, Sir KENYON VAUGHAN-MORGAN (Morgan Crucible Co., Ltd.), Mr. GEORGE BALFOUR (Balfour, Beatty & Co., Ltd.), and Sir WALTER PRESTON (J. Stone & Co., Ltd.). Mr. P. J. PYBUS (chairman of the English Electric Co., Ltd.) gained the Harwich division of Essex in the Liberal interest, but Mr. W. PRESTON (W. Sanders & Co.) failed to hold Walsall for the Conservatives. Mr. E. KILBURN SCOTT (Liberal) was unsuccessful at South Leeds. Ald. JOHN ARNOTT, who won South-West Hull for the Labour Party, is chairman of the Leeds Corporation Tramway Committee and an ex-Lord Mayor of Leeds.

Mr. E. MORGAN, chief engineer and general manager of the Wolverhampton Corporation Electricity Department, has been recommended for the position of general manager and engineer of the Sheffield Electricity Supply Department, at a commencing salary of £1,250 per annum. The appointment was to be considered by the City Council this week.

Mr. J. BRIERLEY, traffic superintendent of the Wigan Corporation Tramways, has been nominated for the position of general manager of the undertaking, and the proposed appointment is to come before the Town Council at its next meeting. Mr. Brierley is an Oldham man, and he will succeed Mr. C. Hopkins, who has been appointed tramway manager to the Sunderland Corporation.

Miss ROSALIND HASLETT has been appointed buyer in the Electrical Department of Messrs. Shoolbred's, Ltd.

Mr. JOHN MORRISON, Preston, Lancs., and late of Kirkcaldy, has been appointed electrical and mechanical engineer to the Carmen Valley Gold Mines, Ltd., Colombia.

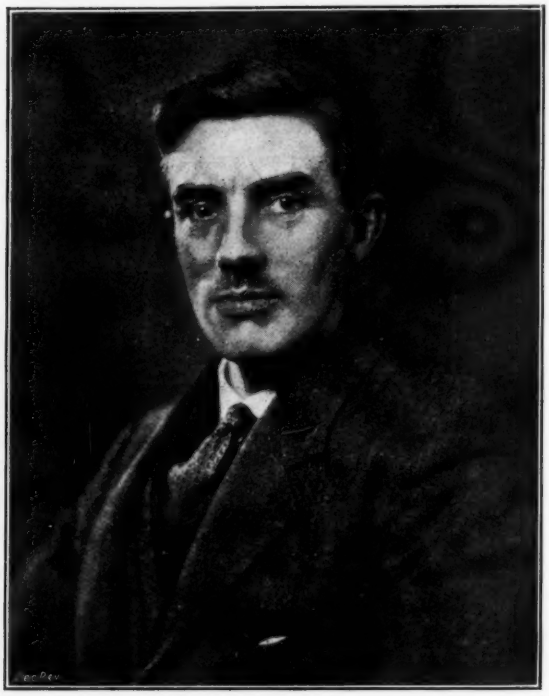
Mr. R. ALAN S. THWAITES, M.Inst.C.E., M.I.E.E., M.I.Mech.E., of the Yorkshire Electric Power Co., has been elected vice-chairman of the Yorkshire Association of the Institution of Civil Engineers.

The Glasgow Corporation Electricity Committee recommends the appointment of Mr. THOMAS I. CRAIG, now mains district superintendent, as sales manager, at a salary of £600 rising by two-yearly increments of £50 to a maximum of £800.

Consequent upon the resignation of Mr. J. D. PEATTIE, distribution development engineer, the following appointments have been made by the Manchester Corporation Electricity Committee:—Mr. H. Hawkins, h.p. mains engineer, appointed distribution development engineer; Mr. A. W. Crompton, technical assistant, appointed assistant distribution development engineer; and Mr. P. T. Fowler, assistant h.p. mains engineer, appointed h.p. mains engineer.

It is announced that Mr. W. H. NAPIER, Deputy Controller, is to succeed Mr. W. A. Valentine, C.B.E., as Controller of the London Telephone Service.

We reproduce herewith a portrait of Mr. C. ELLIOTT, B.Sc., A.M.Inst.C.E., A.M.I.Mech.E., who, as we reported in our last issue, has taken the place of the late Mr. Charles Stanley as general manager of the Birmingham Section of the British Industries Fair. Mr. Elliott, who is 41 years of age, was educated at St. Andrew's College, Dublin, and Victoria University, Manchester. After serving with the Great Central Railway as a pupil-apprentice, he became assistant locomotive superintendent of the Sheffield district. Later he was appointed chief engineer to a large North Wales chemical works, and during his time there prepared designs for new



Mr. C. Elliott, B.Sc.

The new manager of the Birmingham Section of the B.I.F.

buildings occupying 12 acres and costing over £500,000. He next spent seven years in private practice as a consulting engineer in Manchester. As honorary secretary of the Smoke Abatement League, he formed branches and associations all over the country, and he was the honorary organising secretary of the National Smoke Abatement Exhibition held in Birmingham in 1926. Immediately afterwards he was placed in charge of the great Steam Power Section of the 1927 British Industries Fair, and commenced to act as technical assistant manager to the Heavy Section of the Fair under Mr. Stanley. Many of the changes and improvements which have been introduced were due to Mr. Elliott, and the yearly extensions of the Fair buildings have been carried out from his designs.

Mr. JOHN GRICE STATTER, M.I.E.E., A.M.Inst.C.E., of Messrs. J. G. Statter & Co., is due to arrive at Liverpool on June 10th, by the *Walmer Castle*, after a successful business trip, renewing many electrical acquaintanceships, in South Africa.

The marriage of Mr. R. B. RENWICK, son of Sir Harry Renwick, Bart., K.B.E., to Miss Dorothy Mary Parkes, elder daughter of Mr. and Mrs. Harold Parkes, of Alveston, Stratford-on-Avon, will take place at St. Margarets, Westminster, on June 10th.

Mr. F. W. KEEN, late assistant engineer to the Harwich Corporation Electricity Department, has been appointed district engineer to the Wessex Electricity Co.

Col. Sir T. F. PURVES, engineer-in-chief of the General Post Office, has been nominated as the next President by the Council of the Institution of Electrical Engineers.

Obituary.—MR. W. HOWARD HAZELL.—Few men in the great printing industry of this country have been more highly respected for many years past than Mr. W. Howard Hazell, chairman of Messrs. Hazell, Watson and Viney, Ltd., who passed away at the age of 59 on May 30th, at his home in London. He had during the war and since, a great zeal for improving the relations of employers and employed, and wrote many articles for *The Times* and other journals on "Industrial Relations"; he was an expert authority on printing costs, had been a president of the Federation of Master Printers, and had much to do with the establishment of the London School of Printing. He served on the Melchett-Turner Committee, was greatly interested in co-partnership, devoted much time to child welfare, and by his friends with whom he faced the immense difficulties of the printing trades during the great war, was most highly esteemed.

MR. W. F. OAKFIELD.—The *Siemens Magazine* for June records the death, on May 19th, of Mr. W. F. Oakfield, who entered the service of the Siemens Company in 1880 as assistant to Dr. Obach in the Chemical Laboratory. Mr. Oakfield was in his 67th year.

M. DE LAPISSE.—The death is announced from Paris of M. J. de Lapisse, president of the Compagnie d'Electricité de Limoges, and a pioneer of long-distance electric power transmission schemes in France.

MR. J. SHEPHERD.—The death occurred on May 28th of Mr. Joseph Shepherd, electrical engineer, Bexley, Kent. He was 61 years of age, and was for a number of years assistant electrical engineer to the London County Council. After his retirement he went to Russia as an electrical expert for the British Government, and he was in that country when the revolution took place.

MR. H. GLEAVE.—The sudden death is announced, at the age of 30 years, of Mr. Herbert Gleave, who was chief electrician to the Chemical and Metallurgical Corporation, Ltd., Runcorn. He was previously with the St. Helens Cable and Rubber Co., Ltd.

Will.—The late Mr. T. H. MORRIS, secretary of Ferranti, Ltd., of Manchester, left £5,879 gross and £4,745 net personalty.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Mainten Manufacturing Co., Ltd.—Private company. Registered May 28th. Capital, £1,300 in £1 shares. Objects:—To acquire the business of wireless engineers and makers of wireless components carried on by H. R. Malby at 126, Portland Road, Hove. The directors are:—H. R. Malby, 126, Portland Road, Hove; A. F. Griffith, 74, Beulah Hill, Upper Norwood, S.E. Registered office: 126, Portland Road, Hove.

Riversdale Radio Co., Ltd.—Private company. Registered May 25th. Capital £200 in 1s. shares (100 7 per cent. cumulative preference and 3,900 ordinary). Objects:—To adopt an agreement with W. H. Johnson, trading as the Riversdale Radio Co., and to carry on the business of manufacturers or vendors of wireless receiving sets and components formerly carried on by the above at 179, London Road, Kingston-on-Thames. The first directors are:—W. H. Johnson, radio engineer, and Mrs. M. O. Johnson, "The Stump," Riversdale Road, Thames Ditton Secretary: A. M. Kingsley, "Rowardennan," Rusland Road, Harrow. Registered office: 179, London Road, Kingston-on-Thames.

Tee-Kay Radio, Ltd.—Private company. Registered May 25th. Capital, £100 in 1s. shares (50 7 per cent. cumulative preference and 1,950 ordinary). Objects:—To adopt an agreement with Marjorie O. Johnson, trading as the Tee-Kay Radio Co., and to carry on the business of manufacturers or vendors of wireless receiving sets and components formerly carried on by her at 19, Fairfield West, Kingston-on-Thames. The directors are:—R. A. Kidd, 112, Churchill Road, Willesden Green, N.W.2, cabinet manufacturer; T. Keeling, Caxton House, High Street, Hampton Wick, radio manufacturer. Secretary: A. M. Kingsley, "Rowardennan," Rusland Road, Harrow Registered office: 112, Churchill Road, Willesden Green, N.W.2.

Regional Radio, Ltd.—Private company. Registered May 29th. Capital, £500 in £1 shares. Objects:—To carry on the business of radio engineers and contractors, electricians, manufacturers of wireless apparatus and accessories, &c. The first directors are:—A. J. Richardson, Flat 2, Museum Mansions, Great Russell Street, W.C.1; H. Cormack, 51, Lorrimore Road, Kennington, S.E.17 Registered office: 9, Southampton Street, W.C.1.

Protos Electric, Ltd.—Private company. Registered May 27th. Capital, £1,000 in £1 shares. Objects:—To manufacture, export and import and deal in electrical apparatus, and to adopt an agreement between Siemens Schuckertwerke A.G., of the one part, and J. A. Milne, of the other part, for the acquisition by the latter of a licence from the former to sell in Great Britain goods bearing the trade mark "Protos." The subscribers (each with one share) are:—J. A. Milne, 82, Hazelwood Lane, Palmer's Green, N.13, company secretary; W. J. Ellison, 16, Southampton Street, W., bookkeeper. J. A. Milne is the first director. Registered office: New Bridge Street House, 30-34, New Bridge Street, E.C.4.

British Italian Power and Irrigation Trust, Ltd.—Registered May 28th as a public company. Capital, £75,000 in 70,000 ordinary shares of £1 each and 100,000 deferred shares of 1s. each. Objects:—To adopt an agreement with the French, British and Foreign Trust, Ltd., to enter into or acquire and carry out contracts, concessions or grants in any part of the world for the construction, repair, maintenance, operation or control of electric, hydraulic and other works, electric or other lighting, railways, tramways, and other roads or ways; to carry on the business of general contractors, generators, distributors, suppliers, and employers of electricity for light, heat and power; and that of bankers, financiers, &c. The subscribers (each with one ordinary share) are:—W. H. Walford, 10, Lambourne Road, Leytonstone, E.11, clerk; H. W. Brown, 63, Effingham Road, Lee, S.E.12, clerk; and five other clerks. The first directors are to be appointed by the subscribers. Registered office: Dashwood House, 69, Old Broad Street, E.C.2.

Peacock & Waller, Ltd.—Private company. Registered May 27th. Capital, £2,000 in £1 shares. Objects:—To acquire the business of electrical and motor engineers and electricians now carried on by A. T Peacock and F. Waller at Leicester Road, Hinckley, as "Peacock & Waller." The directors are:—F. Waller (permanent), 13, Leicester Road, Hinckley; A. T. Peacock, 15, Leicester Road, Hinckley. The said A. T. Peacock may be a permanent director so long as he holds 250 shares. Solicitor: T. Flavell, Church Street, Hinckley.

Phonetic Electric, Ltd.—Private company. Registered May 25th. Capital, £100 in £1 shares. Objects:—To carry on the business of dealers in, and suppliers, repairers and installers of wireless, radio, and electrical goods of all kinds, gramophones, &c. The directors are:—H. B. J. Dailey (managing director), Beachwood, Mumbles; W. R. Banfield, 8, Newton Road, Mumbles. Registered office: 14a, The Dunns, Mumbles, Swansea.

B.O.W. Patents, Ltd.—Private company. Registered May 27th. Capital, £300 in £1 shares. Objects:—To adopt an agreement with A. Wright and H. J. Osborn, to develop and turn to account the inventions forming the subject of the British, Colonial, and foreign patents comprised in the said agreement, and to carry on the business of electrical and mechanical engineers, &c. The permanent directors are:—A. Wright, 124, Chancery Lane, W.C.2; H. J. Osborn, 124, Chancery Lane, W.C.2; C. R. Belling, Bridge Works, Southbury Road, Enfield, Middlesex. Registered office: 451, Southbury Road, Enfield.

Railway Radio, Ltd.—Private company. Registered May 27th. Capital, £1,000 in £1 shares. Objects:—To acquire any inventions, patents and secret processes in connection with the establishment of radio communication to and from railway trains or other forms of transport; to manufacture and deal in wireless apparatus and radio accessories, &c. The directors are:—Hon. Richard Norton, 35, Catherine Street, Westminster, S.W.; C. E. Raphael, 38, Hill Street, W.1. Registered office: 12-13, South Place, E.C.2.

Official Returns of Electrical Companies.

Midways Electric, Ltd.—Particulars filed of £400 debentures authorised May 2nd, 1929, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

England-Richards Fluid-Free Cell Co., Ltd.—Mortgage dated May 17th, 1929, to secure £400, charged on land with repository, &c., thereon, in Waterloo Street, King's Lynn. Holder: Miss M. Lyon, Seaforth House, Heacham, Norfolk.

Gordon White & Co., Ltd.—Satisfaction in full of debenture dated November 27th, 1928, securing £350. (Notice filed May 21st, 1929.)

John Kirkaldy, Ltd.—Satisfaction to the extent of £8,000 on various dates from May 15th, 1909, to May 15th, 1929, of debentures dated December 28th, 1906, securing £12,000.

Electramonic Co., Ltd.—Satisfaction in full on April 5th, 1929, of charge dated March 24th, 1928, securing £15,000.

United Ebonite Manufacturers, Ltd.—Debenture charged on freehold land and premises at Chadwell, and the company's undertaking and property, present and future, including uncalled capital, dated May 16th, 1929, to secure all moneys due or to become due from the company to Martin's Bank, Ltd.

"M.P.A." Wireless, Ltd.—Particulars filed of £35,000 debentures and bonus of 12½ per cent. authorised April 30th, 1929, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £13,490.

J. Tee & Co., Ltd.—Debenture dated May 17th, 1929, to secure not more than £1,000, charged on the company's property, present and future, including uncalled capital. Holders: Pettigrew & Merriman (1925), Ltd., 2-4, Bucknall Street, W.C.2.

City and General Radio Co., Ltd.—Capital, £250 in £1 shares. Return dated April 12th, 1928 (filed February 22nd, 1929). 102 shares taken up. £2 paid. £100 considered as paid. Mortgages and charges, £500.

Domestic Electric Generators, Ltd.—Capital, £3,000 in £1 shares. Return dated December 31st, 1928 (filed April 16th, 1929). 2,100 shares taken up. £952 paid. £1,148 considered as paid. Mortgages and charges, nil.

Essex Radio Supplies, Ltd.—Capital, £1,500 in £1 shares. Return dated May 17th, 1928 (filed February 14th, 1929). 500 shares taken up. £500 paid. Mortgages and charges, nil.

Bann Syndicate, Ltd.—Capital, £10,000 in £1 shares. Return dated January 14th, 1929 (filed February 2nd). 8,002 shares taken up. £8,002 paid. Mortgages and charges, nil.

Resisto Electric Wire and Tape Co., Ltd.—Capital, £500 in £1 shares. Return dated October 8th, 1928 (filed March 23rd, 1929. All shares taken up. £500 paid. Mortgages and charges, nil.

Austin Brothers Electrical Co., Ltd.—Capital, £1,000 in £1 shares (700 ordinary and 300 preference). Return dated July 30th, 1928 (filed April 2nd, 1929). All shares taken up. £700 paid. £300 considered as paid. Mortgages and charges, nil.

West Wales Electric, Ltd.—Capital, £500 in £1 shares. Return dated September 14th, 1928 (filed April 12th, 1929). 450 shares taken up. £450 paid. Mortgages and charges, nil.

Midland Electric Lamp Co., Ltd.—Capital, £100 in £1 shares. Return dated April 5th, 1929. All shares taken up. £100 paid. Mortgages and charges, nil.

West Insulating Co., Ltd.—Capital, £1,500 in £100 shares. Return dated April 11th, 1929. 10 shares taken up. £500 paid. £500 calls unpaid. Mortgages and charges, nil.

C. J. Thursfield & Co., Ltd.—W. E. Alldrith, Sun Buildings, Bennett's Hill, Birmingham, was appointed receiver and manager on May 18th, 1929, under powers contained in debentures dated January 8th, May 13th, 1929, and October 10th, 1927.

P. Kay, Ltd.—G. C. Jarvis, 115-117, Cannon Street, E.C.4, was appointed receiver by Order of Court dated May 16th, 1929.

Electrical Contracts and Maintenance Co. (1925), Ltd.—Satisfaction in full on May 14th, 1929, of debenture dated February 24th, 1925, securing £250.

City Notes.

Marconi's Wireless Telegraph Co., Ltd.

The annual meeting was held on May 30th, Lord Inverforth (chairman) presiding. In presenting the report and accounts (*vide* ELEC. REV., May 17th, p. 886), the chairman said that the broadcasting patents would expire during this year and 1930, with the result that revenue from this source would probably be substantially reduced in the future. The era

of "master" patents in broadcast reception had passed, and inventions of the future would be rather in details than in fundamentals. The interests exploited by the Marconiphone Company and by the Sterling Telephone & Electric Co., which was the manufacturing side of the Marconiphone business, had been sold to the Gramophone Company. Payment would be received in shares in the Gramophone Company for the goodwill and in cash for the fixed assets. Referring to the company's claim against the Government for the use of its patents by the fighting forces, a suggestion which had unofficially been made was disappointing, and it would have to be considered at the earliest opportunity whether the Government should be called upon immediately to have the issue arbitrated upon. The company's grounds for agreeing to the cable-wireless merger (details of the scheme were given in the ELEC. REV., April 19th, p. 720) were because the Government had decided that the exploitation of the beam system of wireless telegraphy for Imperial communications was to be taken out of the hands of the company which had invented and developed the system and was to be made a monopoly of the Post Office. The Government licence to the company excluded it from any part in the operation of wireless telegraph services from this country to the rest of the Empire. It was therefore faced with the position in which it had to consider where it would be if its traffic revenues were to be derived only from its foreign services and from its investments in its Dominion and Indian companies. As the company's foreign services were developed and its Dominion companies began to cut into the revenues of the cable companies, it was certain that these companies would embark on a rate war. If the cable companies reduced their rates to the wireless level, the Post Office would further reduce its rates. During recent years there had been an unfortunate tendency on the part of certain British companies operating in foreign countries to dispose of the control of their companies to foreign interests. If an organisation like Cables and Wireless, Ltd., had been in existence during the past 10 years it could have prevented the transfer of these important British companies into foreign hands. The allocation of shares in Cables & Wireless, Ltd., amongst the different classes of shareholders of the company had been criticised by certain holders of £1 shares. The committee which was urging the £1 shareholders not to accept the scheme was taking on itself a serious responsibility, and the directors believed the advice which it was giving was unsound. Regarding the future of the Marconi Company, whilst it would be disposing of all its traffic assets, and Cables & Wireless, Ltd., would own a very large proportion of the shares, it would continue to carry on its sales and manufacturing business and the research incidental to the success of that business. To avoid any danger that the control of Imperial and International Communications, Ltd., by Cables & Wireless, Ltd., might be exercised contrary to the public interest, the Government had insisted on certain safeguards. It would be some time before complete co-ordination of these two organisations could be effected, and until that had been effected the earnings of the company would not reflect the large economies which co-ordination would bring about. The report and accounts were adopted, and resolutions altering the articles of association to comply with the conditions of the merger were passed.

It was reported last week that a writ had been served upon the Marconi Company by the Venture Trust, Ltd., on behalf of holders of £1 ordinary shares. The Trust claims a declaration that the merger scheme is *ultra vires* and inequitable to the £1 ordinary shareholders; an injunction restraining the company from carrying the scheme into effect; and damages and costs.

Cable Companies' Meetings.

Meetings of the Eastern Telegraph Co., Eastern Extension, Australasia and China Telegraph Co., Ltd., and the Western Telegraph Co., Ltd., were held on May 29th, at which Mr. J. C. Denison-Pender (chairman) presided. The chairman during his remarks referred to the cable-wireless merger and the events which led up to it. He stated that dividends would not in future be paid quarterly under the changed conditions. Those shareholders who accepted the change would receive proportions of three classes of shares of a nominal value largely in excess of their present nominal holding, and would receive half-yearly dividends on the preference shares comprised in their new holding, and these would cover a large proportion of the present dividends in the case of those who joined the merger. Resolutions were passed altering the articles of association to comply with the conditions of the merger.

Ever-Ready Co. (Great Britain), Ltd.

Presiding at the annual meeting on May 31st, the chairman and managing director (Mr. Magnus Goodfellow) said that the sales and profits for the year constituted a record, and if the industry had been protected by an import duty, the development would have been greater still, as calculations showed that if portable lamps and dry batteries imported into this country had been manufactured in their own factories some 5,000 additional workpeople would have been employed. A new factory had been purchased and equipped which would contribute a large addition to the company's manufacturing facilities during the current year. The acquisition of Lissen, Ltd., was of great importance. Steps had been taken to bring about a close collaboration between the businesses, and since September 30th, 1928, the end of the year on which their participation was based, the sales of Lissen, Ltd., had increased by over 25 per cent. as compared with the corresponding period of the preceding year. It was clear from the fact that the sales for April and May this year were 25 per cent. above the sales of April and May, 1928, that no question of drawing upon the dividend equalisation reserve was likely in the near future. The report and accounts were adopted.

British Electric Traction Co., Ltd.

The gross profit for the year ended March 31st last was £330,822 (against £311,908), and after deducting expenses and interest there remains a balance of £196,995, which the directors recommend should be applied in payment of the following dividends—6 per cent. preference dividend; 8 per cent. on the preferred ordinary stock; and 5 per cent. on the deferred ordinary stock, leaving a surplus of £40,735. The directors proposed that of this balance, £14,788 (equal to 10 per cent. on the deferred ordinary stock), be capitalised and distributed to the deferred ordinary stockholders in fully-paid deferred ordinary shares of £1 each, to be converted subsequently into deferred ordinary stock. The preference stockholders will then be entitled to a further dividend of 1.67 per cent. (making 7.67 per cent. for the year), leaving a balance of £14,025 to be added to undivided profits account, making that account £186,251. The report announces the retirement of Mr. E. Garcke, the founder of the company.

International Telephone and Telegraph Corporation.

The consolidated balance sheet of the Corporation and its associated companies as at December 31st, 1928, showed total assets of $389,914,333. The total gross earnings of the companies during the past year amounted to $81,234,824, and the net earnings to $23,053,829. After meeting charges of associated companies and interest on debenture bonds there was a net income of $14,596,337. With the addition of a balance of $15,636,018 the total surplus was $30,232,355. After deducting dividends, &c., the earned surplus remaining was $21,471,677, and the capital surplus was $13,238,084, giving a total of $34,709,761. A lengthy report of the companies' world-wide activities appeared in *The Times* and other daily newspapers on Monday last. A list of the associated and affiliated companies included the extensive Mackay Companies, All-America Cables, Inc., the International Standard Electric Corporation and its subsidiaries, and a number of American, South American, European, and Asiatic concerns.

Companies Struck off the Register.

The names of the undermentioned companies have been struck off the Register, and they are thereby dissolved :—

Ace Battery Co., Ltd.
Barford Electric Supply Co., Ltd.
Bell Battery & Accessory Co., Ltd.
C.A.T. Cable Co., Ltd.
Chalk Fuel, Power, Gas and By-Products Corporation, Ltd.
Direct Electrical Co., Ltd.
Electric Light and Power Contracts Finance Corporation, Ltd.
Export Electric Fittings Co., Ltd.
Gray Electrical Co., Ltd.
Neale Magnet Construction Co., Ltd.
Northern Lift & Electrical Co., Ltd.
Portarlington Electric Light & Power Co., Ltd.
Premier Telephone & Wireless Co., Ltd.
Radio Service Co. (Birmingham), Ltd.
South Midlands and Berkshire Electric Light and Power Co., Ltd.
Sparkes Electrical Co., Ltd.
Watford Radio Supplies, Ltd.
Wireless Headphone Distributing Co., Ltd.
Wireless Warehouses, Ltd.

Bahia Tramway, Light and Power Co.

The *Financial Times* reports that negotiations for a settlement of the long-outstanding claim of the company against the Municipality of Bahia have now been concluded. The arrangement provides for cash payments spread over a period of three years, and, it is estimated, should result in a total distribution to the debenture holders of approximately 30 per cent. of the nominal amount of their debentures. In 1914 the company agreed to accept payment for the business, which was sold to the municipality, in the shape of 6 per cent. bonds, which are held by the trustees for the debenture holders. The municipality has defaulted on both interest and sinking fund payments on the bonds and, although an initial payment was made on account of this service (partly in cash and partly in bills, the latter of which have been dishonoured), has attempted to repudiate the bonds.

Brazilian Traction, Light and Power Co.

The total income from subsidiaries and investments for the year ended December 31st, 1928, was $14,762,619 (Canadian). After meeting expenses and general amortisation, the net revenue is $14,121,604. Two quarterly dividends of 1¾ per cent. on shares of $100 par value and two of 44 c. each on shares of no par value were paid on the ordinary shares, leaving a surplus of $6,053,459, to which is added $8,893,907 brought forward. Of this, $5,000,000 has been transferred to general reserve and the balance carried forward.

Stock Exchange Notices.

Dealings in the following have been allowed by the Committee under Rule 159:—

Central Electricity Board.—£3,000,000 4 per cent. stock, 1959-89, issued at £83 per cent., partly paid and fully paid.

The undermentioned have been ordered to be officially quoted:—

Agar Cross & Co.—350,000 8 per cent. second cumulative preferred shares of £1 each, fully paid, Nos. 1 to 350,000.

Underground Electric Railways Company of London.—11,996 ordinary shares of £1 each, fully paid, Nos. 7,147,911 to 7,159,906.

Richard Johnson & Nephew, Ltd.

The first annual meeting was held on May 31st, Major E. Johnson (chairman) presiding. In presenting the report and accounts, the chairman said that although the present company was holding its first annual meeting, the private company of the same title was formed in 1900. Although competition with foreign manufacturers was very keen, there was a considerably larger tonnage of unfinished orders than on the date of the formation of the company a year ago. The report and accounts were adopted.

Sphere Investment Trust, Ltd.

The dividends, interest, &c., received during the year ended March 31st last amounted to £32,225, as compared with £46,160 in 1927-28. To this is added £9,431 transferred from a reserve now no longer required for its original purpose. Nothing has accrued with respect to dividends received since the date of the balance-sheet, whereas £17,560 was so accrued last year. Future revenue will be entirely on a cash basis. After meeting expenses and adding £4,745 brought forward, the available balance is £43,374. From this the preference dividend is paid, and it is proposed to maintain the ordinary dividend at 4 per cent., leaving £3,374 to be carried forward. Meeting: June 11th.

Western Union Telegraph Co.

The balance-sheet as at December 31st, 1928, shows total assets of $350,424,344 and a surplus of $86,357,183. The gross operating revenue for the year was $136,449,513, and the balance transferred to surplus account was $15,467,659. At the close of the year the Western Union System comprised 216,169 miles of pole lines; 1,852,069 miles of wire; 3,545 miles of land-line cables; 30,680 nautical miles of ocean cables; and 24,842 telegraph offices.

International Aluminium Co., Ltd.

The net profit for 1928 was £25,711 to which is added £3,982 brought forward, making £29,693. A final dividend of 3½ per cent. on the preference shares has been paid, making 7 per cent. for the year and it is recommended that £10,000 be set against expenses relative to raising of capital, leaving £9,198 carried forward.

Torpoint Electric Supply Co., Ltd.

Edmundson's Electricity Corporation, Ltd., has made an offer to purchase the whole of the issued shares of the company at 26s. 4d. for each preference share and 10s. for each ordinary share, the offer being conditional upon its acceptance by the holders of at least 80 per cent. of both classes of shares.

Hastings and District Electric Tramways Co., Ltd.

The report for 1928 shows that after crediting £487 brought forward, there was a loss of £15,490, as compared with a profit of £8,610 in 1927. The receipts for the year were adversely affected by the change-over from tramway to railless cars, and by the remaking of roads.

Doulton & Co., Ltd.

A dividend at the rate of 5 per cent. per annum is recommended on the ordinary shares for the past year.

International Combustion, Ltd.

A dividend of 6 per cent. has been declared on the preference shares.

Stocks and Shares.

MONDAY EVENING.

WHILE the first effect of the election upon Stock Exchange prices was to bring about a lower range of values in gilt-edged and other investment securities, this tendency quickly gave way to a firmer tone when it became apparent that the public did not intend to sell stocks and shares—at all events at present. It is contended that if a Labour Government comes into office, its majority will be too slender for Ministers to embark upon venturesome Socialistic legislation, and that, accordingly, the work of the country will go on in much the same way as it has been doing of late years. Therefore the prices, on the week, show few changes of consequence, and most of the falls sustained last Friday were recovered at the beginning of this week.

The Central Electricity Board Issue.

Central Electricity Board 4 per cent. debenture stock, which was left with the underwriters to the extent of about 78 per cent., went back to 1¼ discount: afterwards it rallied to ¾ discount. The issue price, it will be remembered, was 83, and the prospectus made its appearance at an unfortunate moment, so far as its probable success was concerned. From the security point of view, the stock is first-class, but the price asked for it looked obviously high, and it is not surprising that the public should have accorded the issue a lukewarm reception. Moreover, it stands outside the range of trustee investments. As the issue becomes absorbed by investors, the price will recover, because people like a stock which is quoted so considerably under par as to render improvement mechanical when, in course of time, the redemption-dates begin to attract attention.

Home Electricity Supply.

Labour majorities are not supposed to be of much use to the market for shares in the electricity supply companies. Midland Counties, in which an active business is doing, are 6d. up at 33s., and Metropolitans 1/16 to 47s. 6d. County of Londons have shed a few pence at 54s. 6d., and Electric Supply Corporation 1/16, at 56s. 3d. Urban ordinary at 2 are ex the dividend of 9 3/5d. Newcastle and District retain their advance to 28s. 9d. Northamptons at 46s. are 1s. higher, and Llanelly ordinary improved upon their previous gain by a further rise, to 16s. 3d. The company's 6 per cent. preference shares stand at 17s. 6d., and the 5 per cent. first mortgage debenture stock last changed hands, at 94½, about a month ago. Lancashire Electric 5 per cent. debenture stock commands 100, the same price as London Power 5 per cent. debenture stock. Isle of Wight 4½ per cent. debenture stock stands, relatively, rather lower at 83½, while Kent Electric Power 4½ per cent. irredeemable debenture is 87½. At 78½ Isle of Thanet 4 per cent. debenture yields £5 2s. on the money. The company's ordinary shares are lower this week at 38s. 3d.

Cables and Marconis Weaken.

Meetings of the Eastern Extension group, and of the Marconi shareholders, held last week, made it tolerably clear that, so far as the cable companies go, the requisite 60 per cent. assent will be obtained without any difficulty in connection with the new wireless and cables merger scheme. There seems to be rather more doubt prevailing in reference to Marconis, where further legal proceedings threaten to impede the smooth interchange of Marconi shares into those of the new combine. The price of Marconis went back to 78s. 9d., and Eastern Telegraph ordinary stock fell to 270. The chairman dealt, at the meeting a week ago, with the matter of the dividend payments, pointing out, as was done here, that the preference distribution would be made half-yearly, and that this would go some way towards compensating shareholders in the Eastern Companies for the lack of the usual quarterly dividends to which they had been accustomed in the past. In the same speech he mentioned that dividends on the "A" and the "B" ordinary shares of Wireless and Cables, Ltd., could hardly be expected to start immediately, but that this matter would be considered when co-ordination had been completed, economies effected, and the way opened to such progress as, in the opinion of himself and his fellow-directors, justified them in recommending acceptance, on the part of their fellow-proprietors, of the new scheme.

International Intercommunication.

Eastern Extensions and Western Telegraphs are also lower. It is remembered that the Labour Party opposed the cables-wireless merger in the last Parliament, before the plan became finally passed. The market in all the cable-wireless descriptions has grown rather more limited than usual. Bargains are being settled in Bank of England deposit certificates, which represent assented shares in the cable companies and in Marconis. Hints are being thrown out, both in this country and in America, as to the possibility of some future agreement of interests between the British communication companies and those of America. Readers will remember that a denial was issued of the report that the International Telephone and Telegraph Corporation had bought the Radio Corporation of

America. At the time of the statement being published, the further suggestion was put forward that such an arrangement —made between, that is to say, the Radio Corporation and the International Telephone and Telegraph Company—would put the latter into a position of being able to compete with the British companies in all matters affecting the wireless and cable industry. Reports which touch upon these affairs must clearly be accepted with a good deal of reserve. International Telephone and Telegraph stock at 250 has not changed on the week, but American Telephone and Telegraph at 212 is $3 down.

Brazilian Traction.

The Brazilian Traction Company has issued the full figures of its report, and these bear out the favourable impression created by the preliminary figures, which failed to exert any particular effect in the share market. The price of Brazilian Tractions has hardened to 53½. The report shows that gross earnings were higher in 1928 by more than 11 per cent. A good part of the additional income was retained as net revenue. Reserves have been liberally provided for, and the rate of dividend on the common shares has been advanced during the year. The balance forward is increased to five million dollars. The recent issue of shares gave the company over 30 million dollars of fresh capital, the issue being made in connection with the purchase of the City of Santos Improvements Company. Anglo-Argentine Tramways second preference receded to 3⅝, coming into line with the price of the first preference. The latter are entitled to a 5½ per cent. dividend, against the 6 per cent. of the second preference. Mexican utility issues exhibit no alteration in the prices.

Shares in Manufacturing Companies.

General Electric ordinary receded to 52s. 6d., while Associated Electrical Industries strengthened to the same price. Siemens, Johnson & Phillips and Brush ordinary were all quoted ex dividend last week. The first two named regained the deductions of 1s. per share in each case. Brush went ex the full year's dividend of 2s., and the price at 27s. 6d. is practically unaltered, allowing for the dividend. All these amounts are less tax. The Electric Construction Company has reduced its dividend by 2 per cent. to 5½ per cent. for the past year. The company has a dividend equalisation fund of £30,000, from which £10,000 has been taken in order to pay the 5½ per cent. dividend. The profit of £8,738 is £11,800 less than that earned in the previous year. Nominally the price of the shares, 18s. 9d., has undergone no alteration. Ever-Readys are firm at 23s. 6d.

A Rise of £150.

It is refreshing to be able to quote a rise of 150 points amongst the recital of price-movements mainly small and—so far as the falls are concerned—precautionary. British Electric Traction has achieved this gain, and is up to £1,200. Business is marked at this price to-day, Monday. London and Suburban Traction preference eased off to 12s. 6d. The ordinary shares are about 4s. Tube Railway issues show no particular movement. The Home Railway market, as a whole, has been hoping that the companies will draw benefits from the next Parliament, whatever its political complexion. Interest has been aroused by the statement that 2,000 petrol-electric omnibuses, owned by the large electric railway companies, are working in America.

Preference Shares Available.

Amongst preference shares on offer, at the time of writing, are 10,000 Associated Electrical Industries 8 per cents., paying £5 16s. 9d. at 54s. 9d. for the £2 shares; 5,000 Bridgwater and District Electric Supply 7 per cent. at 23s., yielding £6 1s. 9d.; a thousand each of Cornwall Power Sevens (with convertible rights into ordinary shares up to 1932) at 24s. 6d., paying £5 14s. 3d., and Edmundsons Sevens at 25s., giving £5 12s. Of the Australian preference shares, Adelaide Fives, tax free, return £4 11s. 9d., tax free, at 21s. 9d.; Melbourne Electric Eights, of £5 each and liable to repayment at 5½ between 1930 and 1935, are offered at 5½, to give 7¼ per cent on the money. Amongst Indian issues, Calcutta Electric Supply 5 per cent. tax free preference, obtainable at 22s. 6d., yield £4 8s. 9d., tax free, and Madras 5½ per cent. tax free preference can be bought at 23s., to pay 4¾ per cent. tax free. Probably, upon coming to deal, a prospective purchaser would find he could buy rather more cheaply than these prices indicate.

Telephone Changes.

The Venezuela Telephone Company proposes to increase its capital in order to provide for extensions, and meetings are called for next Monday to authorise the creation of new non-voting "A" ordinary shares. These the board intends to issue upon bonus terms. Oriental Telephones have gone back to 3, and Constantinople Telephones also are lower at the same price. Great Northern Telegraphs shed £1, on the reduction in the profits shown by the report. Atlas Light and Power firmed up to 27s. The iron and steel division presents no feature of especial interest. Vickers are a few pence lower at 10s. 9d. Rubber shares have fallen into somnolence.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1927,	1928,	Price June 3 1929.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	65/9	—	4 11 4
Brompton Ordinary	1	8½	8½	26/-	—	5 7 8
Charing Cross Ordinary	1	8½	8½	26/-	—	5 7 8
do. do. 4½% Pref. ...	1	4½	4½	17/6	—	5 2 10
Chelsea	1	8¾	8¾	26/6	—	5 5 8
City of London	1	10	10	33/3	—	4 4 6
do. do. 6% Pref.... ...	1	6	6	23/-	—	5 4 4
Clyde Valley	1		8	33/9	—	... ...
County of London	1	7½	10	54/6	—	3 12 9
do. do. 6% Pref.... ...	1	6	6	23/-	—	5 4 4
Edmundson's 7% Pref.	1	7	7	28/-	—	5 12 0
Elec. Supply Corporation	1	11	—	56/3	—⅛	8 18 3
Kensington Ordinary	1	8	8	26/6	—	5 5 8
Lancs. Light and Power	1	7½	7½	29/-	—	5 3 5
London Electric	1	8½	9	27/6	—	5 1 10
Metropolitan	1	9	9	47/6	+⅛	3 16 0
do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Midland Counties	1	6½	6½	33/-	+6d.	3 18 9
Mid. Elec. Power	1	15	8	37/-	—6d.	4 6 6
Newcastle on-Tyne Ordinary ...	1	6	6	26/3	—	4 11 5
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	11	—	5 9 1
North Met. Elec. 6% Pref.	1	6	6	23/-	—	5 4 4
St. James' and Pall Mall	1	8	8	27/6	—	5 1 10
Scottish Power	1	8	8	32/-	—	5 0 0
South London	1	8½	8½	26/6	—	5 5 8
Urban Ordinary	1	7	—	2xd	—⅛	... ...
Westminster Ordinary	1	8½	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref....	1	7½	7½	24/-	—	6 5 0
Yorkshire Elec.	1	8	8	34/6	—	4 12 9

HOME RAILS.

Central London Ord. Assented ...	Stock	4	4	72	—	5 11 1
Metropolitan	"	3	3½	61	—	5 14 8
do. District	"	4	5	77½	—	6 10 9
Underground Electric	£1	5	7	23/6	—	5 19 2
do. do. Income ...	Bonds	6	6	112	—	5 7 2

TELEGRAPHS AND TELEPHONES.

Anglo-Am. Tel. Pref.	Stock	6	6	103	+½	5 16 6
do. Def.	"	1½	1½	24½	—	6 2 5
Automatic Telephone	1	10	12½	2⅛	—	6 1 1
Eastern Extension	10	10	10	27	—½	*3 14 1
Eastern Tel. Ord.	Stock	10	10	270	—2½	*3 14 1
Globe Tel. and T. Ord.	10	10	10	2⅜	—	*3 9 0
do. do. Pref.	10	6	6	11⅜	—	5 5 6
Great Northern Tel.	10	20	—	32	—1	... ...
Indo-European	25	10	10	50½	—	*4 19 0
Marconi	10/-	10	20	78/9	—⅛	... ...
Marconi-Marine	1	12½	15	8½	—	4 16 0
Oriental Telephone Ord.	1	12	12	3	—⅛	... ...
Western Telegraph	10	10	10	27	—½	3 14 1

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	3⅜	—	7 11 8
do. do. 2nd Pref. ...	5	6	6	3⅜	—⅛	8 5 6
do. do. 5% Deb. ...	Stock	5	5	74½xd	—	6 14 3
British Electric Traction Def. Ord.	"	5	5	120	+150	... ...
do. do. Pref. Ord.	"	8	8	190½	—	6 2 7
Brazil Traction	100	7	8	53½	+½	3 14 9
Brit. Columbia Elec. Rly. Pcc. ...	Stock	5	5	94½	—	5 5 10
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	12/6	—6d.	... ...
London United Tram Deb. ...	Stock	4	4	64	—	6 9 1
Mexico Trams, 5% Bonds	—	5	5	77½	—	6 19 10
Mexican Light Common	100	Nil	Nil	72½	—	... ...
do. 7% Pref.	100	7	7	72½	—	9 13 2
do. 1st Bonds	—	5	5	75½	—	6 12 5
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	... ...

MANUFACTURING COMPANIES.

		1926,	1927.			
Assoc. Elec. Ord.	1	—	6	52/6	+⅛	2 5 9
Babcock & Wilcox	1	13	15	64/6	—	*4 13 0
British Aluminium Ord.	1	10	10	51/3	—	*3 18 9
British Elec. Transformer Pref. ...	1	7	7	13/9	—	9 6 8
British Insulated Ord.	1	15	15	3⅜	—	4 0 0
Brush Ord.	1	10	10	27/6xd	—	7 5 6
Callenders	1	15	15	4⅜	—	3 9 0
do. 6½% Pref.	1	6½	6½	1¼	—	5 4 0
Crompton Parkinson Ord.	5/-	—	—	1	—	... ...
do. 8% Pref.	1	—	8	25/-	—	6 8 0
Edison-Swan 1st Pref.	1	7½	7½	25/9	—	7 1 2
do. 5% Deb.	Stock	5	5	86½	—	5 15 7
Electric Construction	1	7½	5½	18/9	—	5 17 4
Enfield Cable Ord.	1	20	20	4½	—	4 14 1
English Electric	1	Nil	Nil	6/-	—	... ...
do. do. Pref.	1	3	Nil	8/3	—	... ...
Gen. Elec. Pref.	1	6½	6½	23/6	—	5 10 8
do. Ord.	1	7½	10	2⅜	—⅛	3 16 4
Henley...	1	25	25	6⅜	—	4 1 7
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	18/9	—	... ...
Johnson & Phillips	1	12½	10	86/3xd	+9d.	5 10 4
Siemens Ord.	1	7½	7½	12⅜xd	+½d.	5 9 1
Telegraph Construction	12	10	10	24½	—	*4 19 8

* Dividends paid free of Income Tax.

Japan's Foreign Electrical Trade.

Figures for 1926 and 1927 Compared.

THE following figures showing Japan's imports and exports of electrical and certain allied goods are taken from the recently-issued annual trade returns of that country for 1927. Comparative statistics for 1926 are also given and notes of increases or decreases added.

Imports.

	1926. Thous. yen.	1927. Thous. yen.	Inc. or dec. Thous. yen.
Submarine telegraphic and telephonic cables (all from Great Britain)	307	1,002	+ 695
Other insulated electric wires—			
Total	1,352	900	− 452
From Germany	1,034	200	− 834
,, United States	72	130	+ 58
Wattmeters—			
Total	825	760	− 65
From Germany	450	430	− 20
,, Switzerland	197	124	− 73
,, United States	158	113	− 45
Other meters—			
Total	2,457	2,690	+ 233
From Great Britain	396	375	− 21
,, France	99	48	− 51
,, Germany	542	694	+ 152
,, United States	1,368	1,490	+ 122
Telegraphic and telephonic instruments and parts thereof— Total	9,811	5,792	−4,019
From Great Britain	3,202	800	−2,402
,, France	59	142	+ 83
,, Germany	2,082	1,927	− 155
,, United States	4,427	2,900	−1,527
Steam turbines—			
Total	2,560	1,240	−1,320
From Great Britain	279	46	− 233
,, France	90	60	− 30
,, Germany	77	130	+ 53
,, Switzerland	480	190	− 290
,, United States	1,630	770	− 860
Water turbines and Pelton wheels—			
Total	2,210	520	−1,690
From Germany	820	42	− 778
,, Switzerland	425	235	− 190
,, Sweden	630	33	− 597
,, United States	330	40	− 290
Dynamos, motors, transformers, convertors and armatures—			
Total	10,690	7,030	−3,660
From Great Britain	1,140	1,280	+ 140
,, France	90	110	+ 20
,, Germany	1,320	1,090	− 230
,, Italy	169	1	− 168
,, Switzerland	540	520	− 20
,, United States	7,370	3,960	−3,410
Dynamos combined with motive machinery—			
Total	660	1,190	+ 530
From Great Britain	220	70	− 150
,, Germany	160	170	+ 10
,, Switzerland	200	650	+ 450
,, United States	85	300	+ 215

Exports.

	1926. Thous. yen.	1927. Thous. yen.	Inc. or dec. Thous. yen.
Insulated electric wires—			
Total	1,860	1,940	+ 80
To China	464	553	+ 89
,, Kwantung	1,020	950	− 70
,, Hong Kong	33	153	+ 120
,, Dutch India	100	125	+ 25
,, Siam	140	110	− 30
,, Chile	42	—	− 42
,, Argentina	41	12	− 29
Electrical machinery and parts—			
Total	2,100	2,240	+ 140
To China	450	605	+ 155
,, Kwantung	1,400	1,250	− 150
,, Hong Kong	30	130	+ 100
,, India	49	55	+ 6
,, Straits Settlements	65	60	− 5
,, New Zealand	50	35	− 15
Telephones and parts—			
Total	250	300	+ 50
To China	45	60	+ 15
,, Kwantung	170	210	+ 40
Electric lamps—			
Total	3,000	3,200	+ 200
To China	485	365	− 120
,, Kwantung	480	390	− 90
,, Hong Kong	60	140	+ 80
,, India	60	95	+ 35
,, Straits Settlements	40	60	+ 20
,, Dutch India	9	14	+ 5
,, Siam	20	15	− 5
,, Great Britain	10	90	+ 80
,, France	6	30	+ 24
,, United States	1,480	1,660	+ 180
,, Canada	240	290	+ 50

[Note.—Yen = about 2s. 0d.]

The Situation in Czecho-Slovakia.

A Prosperous Electrical Industry.

INDUSTRIALLY and financially Czecho-Slovakia appears to be in a very favourable position, judging by a recent report on the economic situation by Mr. H. Kershaw, O.B.E., Commercial Secretary at Prague. (Published by the Stationery Office for the Department of Overseas Trade, 1s. 6d. net.) This prosperity is said to be due to low wages and production costs, to the successful export trade which is fostered in many ways, and to an abundance of cheap coal, steady and complacent workpeople, and a high standard of technical efficiency, largely inspired by German example. There have been many suggestions that a "Zollverein" or Customs union should be formed by the Republic and neighbouring States, but there are difficulties in the way of this, and in the meantime Czecho Slovak concerns are neutralising the effects of tariffs by establishing or participating in works in adjacent countries. Among the industries which are characterised as "flourishing" is the production of electrical and other machinery. The report does not give separate particulars of production or exports of electrical plant. An appendix shows that during 1928 Czecho-Slovakia imported "machinery, apparatus and parts thereof" to the value of 702,410,000 crowns (about £4,300,000), while exports of this class were valued at 559,444,000 cr. (about £3,400,000). It is also shown that 98 tons of "electric machines and apparatus," valued at 6,569,000 cr. (£40,000) were imported from Great Britain during the year. The electrical porcelain industry increased its exports during the year from 12.6 to 17 million crowns (from £77,000 to £100,000). The three high-pressure porcelain factories have established joint selling bureaux at home and abroad with a view to a thorough utilisation of their productive capacity by specialising in production and by making the best of the existing patents. Prospects are said to be not very encouraging owing to the proposals of a number of countries to raise the import duty on porcelain. Severe competition is being waged between the Czecho-Slovakian, American and Japanese porcelain industries. A section of the report deals with cartels and combines, and shows that many Czecho-Slovakian industries have become linked up nationally and internationally. The copper and brass works have formed a union with a view to ending the price conflicts between the Czecho-Slovakian works and those of Austria and Germany. During the period under review negotiations were commenced for the formation of an International Cable Cartel, of which Czecho-Slovakia desires to become a member.

Dealing with communications, the report says that a contract has been concluded for the laying of a telephone cable between Warsaw and the Czecho-Slovak frontier at an estimated cost of 250 million crowns (about £1,500,000), of which 180 millions will be spent in Czecho-Slovakia. A considerable number of new telephone connections with border countries were inaugurated during the year, and for the first time direct telephone communication with the United States was established. The authorities are planning an extension of the broadcasting system, and orders were recently placed for the erection of two 60-kW stations. Generally speaking, an increase in the use of radio apparatus may be anticipated, notwithstanding a certain setback in 1928 which was probably due to temporary causes only. There is very keen competition among sellers of radio apparatus, and it is to be feared that the number of retail traders exceeds the present market requirements. This has at different times led to "cut-throat" competition," with the result that some of the weaker concerns have collapsed. British exporters would be well advised to satisfy themselves as to the stability and *bona-fides* of local firms before establishing connections.

In another section of the report Mr. Kershaw emphasises the value of a knowledge of languages to commercial travellers doing business in or with Czecho-Slovakia.

The I.M.E.A. Convention—II.

A Report of the Proceedings and Social Functions at the Annual Convention at Torquay.

THE thirty-fourth annual Convention of the Incorporated Municipal Electrical Association was opened last Monday at Torquay in weather that was cloudy, but with sunny intervals. The attendance, the largest yet recorded, reached a total of 1,000, of whom over 30 were engineers responsible for electricity supply undertakings.

The first full gathering of the members was deferred until the evening reception held at the Medical Baths on Beacon Hill by the President, Mr. A. Nichols Moore, supported by the Mayor of Newport, Councillor W. T. Griffiths, J.P. Advantage was taken of the opportunity to renew old friendships, and dancing, that effective social solvent, continued until a late hour.

The following morning saw the beginning of the more serious side of the Convention's business (but how often is "business" synonymous with pleasure!). The proceedings opened in the finely situated Pavilion with the cordial welcome to the members extended by the Mayor of Torquay (Mr. Harry Geen, J.P.), and seconded by Councillor J. Taylor, chairman, Torquay Electricity Committee. The President then delivered his address. At the outset Mr. Nichols Moore made, with the force that the subject deserves, a plea for the better support of the E.D.A. and other associations whose beneficial effect on the industry is incalculable. The chief part of the address was devoted to the development of the theme that the ideal of a cheap and abundant, and also a generally available, supply of electricity can be realised only after the enactment of legislation for organising the control of distribution over wider areas than is generally possible at present. He, in short, advocated the complete "rationalisation" of the electricity supply industry. Mr. Arthur Ellis, in thanking the President, hoped there would not be any early legislation. Though formal discussion of the Presidential address is not permissible, many private debates on the views expressed therein took place during the remaining days of the Convention. These testified to the healthy stimulus given to thought by the President.

At the conclusion of the address the ladies took coffee with Mrs. Nichols Moore, while Ald. W. Walker's paper on "Whitleyism in the Electricity Supply Industry" was read and discussed. To Ald. Walker, himself an engineer, the credit is largely due that Whitley Councils have been a success in at least one important industry, and what he had to say, based on some ten years of practical experience of their working, should prove of interest to many quite outside the sphere of electricity supply. Ald. Walker would give to national agreements approved by Joint Industrial Councils the same validity as now obtains in the case of awards made by Trade Boards. He referred to the scheme for the training of engineers evolved by the National Joint Board as an instance of the work carried out by Whitley Councils other than the negotiation of wages and conditions of employment.

Tuesday afternoon was devoted to a private view of the Electrical Exhibition, a description of which is commenced on another page, and the evening to a reception by the Mayor and Mayoress of Torquay, followed, as on the previous evening, by music and dancing.

Wednesday's programme was a full one—two papers at the Pavilion and two social functions. The morning's business was the consideration of "Recent High Court Cases and Current Legal Problems," brought to the notice of members by Mr. J. H. Rothwell, town clerk of Brighton, and honorary solicitor to the Association. Mr. Rothwell prefaced his "notes" with a tribute to the memory of his predecessor, the late Mr. P. M. Heath. The court case of most topical interest was that relating to the deferred injunction granted against Manchester Corporation in respect of the sulphurous acid emitted from Barton power station—a case which has found so reverberent an echo in the agitation about the projected station at Battersea. The legal problem of greatest practical importance was the question of responsibility for the provision of switchgear with a rupturing capacity adequate for coping with fault conditions when an undertaking is connected to the "grid." Mr. Rothwell would seemingly leave this question to be settled by engineers, a departure, one would imagine, from legal precedent.

The afternoon's paper by Mr. G. Porter, A.M.Inst.C.E., borough electrical engineer of Worthing, was entitled "The Heavy Oil Engine and its Application in Electricity Supply Undertakings." This, the only purely engineering paper of the session, is a most useful contribution to the literature of the subject. Well collated information is given under sections relating to fuel, types of engines, and operation costs. Mr. Porter comes to the conclusion that, generally speaking, the heavy-oil engine cannot compete either for peak or base-load duty with high-efficiency base-load steam plant. He considers, however, that there is a future for this type of engine in the electricity supply industry, for supplying energy to power station auxiliaries and in sub-stations where the capital cost of supplementing the high-voltage feeders is unduly heavy.

A garden party was to be given by the Torquay Electricity Committee in the venerable precincts of Tor Abbey, once the abode of ascetic White Canons, but had to be cancelled owing to rain. An afternoon concert was arranged instead. In the evening members were invited by the Mayor and Mayoress of Torquay to attend a dance at the Medical Baths. The official photograph was to be taken on Thursday morning, and unofficial ones also, if previous years may be taken as a precedent.

Thursday of the Convention week has come to be regarded as "women's day," and their plans included a lecture at the Medical Baths by Miss Partridge to members of the Electrical Association for Women and others on "Women's Work in connection with Rural Electrification in Devonshire," and a private visit to the Exhibition. Meanwhile, the men were to meet at the Town Hall to hear a paper read by Mr. E. J. Jennings, Associate I.E.E., secretary of Birmingham Corporation Electric Supply Department, on the "Standardisation of Methods of Charge." Mr. Jennings was too modest in saying that his paper was "mainly intended for committee members—mostly laymen," as it should certainly be studied by all supply engineers. He insisted on the necessity of paying regard to commercial expediency in tariff-making, instead of relying on "scientific" tariffs aiming at a mythical "equity." He also pointed out the importance of a correct analysis of costs into their standing and running components Mr. Jennings' preference is for a two-part tariff, the primary charge of which is based upon ratable value tempered by floor area.

The afternoon programme covered a visit to the electrically-operated Long Park Pottery and a drive to Widecombe-in-the-Moor for the ladies (transport and tea being very kindly provided by the Torquay Electricity

Committee) and private meetings for the local authority committee members and for the A.M.E.E. In the evening the annual dinner was to be held at the Pavilion.

To-day's plans include the annual general meeting at the Pavilion in the morning and two excursions in the afternoon, one over Dartmoor, *via* Dartmeet and Bovey Tracey, the other to Widecombe-in-the-Moor, *via* Hay Tor and Ashburton.

The only item on the agenda for Saturday is a visit to the Torquay electricity works at Newton Abbot, a description of which was given in our last issue.

Presidential Address.

By A. NICHOLS MOORE, M.I.E.E. (*Abstract*).

The work of your Association during the past year has not been distinguished by any new matters of outstanding importance. The past year has, nevertheless, been an exceedingly busy one for your Association, whose work has steadily increased in both volume and variety.

Possibly none of the allied associations is of greater importance to the future of the electricity supply industry than the British Electrical Development Association. Its position is the counterpart of that of the British Commercial Gas Association, but, unlike the latter Association, it can only raise for publicity and propaganda, in an industry which on the supply side alone represents a subscribed capital of some £350,000,000, the comparatively paltry sum of £40,000 per annum, and until it is at least as fully established and as financially strong as the latter Association it will be unable to fulfil its essential purpose. May I urge those municipal electricity supply authorities who have so far declined to become subscribing members to reconsider their decision and give the Association their active support without delay?

The British Electrical and Allied Industries Research Association will be dealt with during the Convention by one who is more competent to do so than I am; I submit that electrical research was never of such importance as it is to-day.

The Electrical Association for Women should need little commendation for support. It has rich possibilities for service on the part of women in the greater development of electricity supply in the domestic sphere, and is making perhaps much greater progress than some of us anticipated.

The work of the British Engineering Standards Association is better known than that of the Conjoint Conference of Public Utility Associations. The latter renders most valuable assistance in composing divergent views and requirements, and through the Conference it is possible for the electricity supply and gas industries to find much in common to which they can jointly give consideration for the benefit of our respective industries and of the public whom we serve.

During the year your Council has given careful consideration to the Draft Regulations issued under Section 51 of the Electricity (Supply) Act, 1926, for the technically correct and equitable allocation of production costs between fixed and running charges, and for the adjustment of the price in accordance with the power factor. Important issues are involved in the provision of the necessary switchgear to be installed in all stations to be connected, either directly, or through secondary lines, to the "grid." The technical requirements are such as must in most cases involve heavy capital expenditure, and, in the case of many of the smaller undertakings, quite possibly constitute what will relatively be a considerable increase in their capital commitments. In the case of those authorities whose stations are "selected," the providing of the necessary monies would appear to be an obligation placed upon the Central Electricity Board. It is more in the interests of the vast majority of "non-selected" stations that your Council has deemed it necessary to take steps to secure from the Central Electricity Board an assurance that, directly or indirectly, undertakings will be relieved of the heavy burden which might otherwise fall upon them.

The Electric Fittings Statutory Committee was appointed by the Electricity Commissioners under Section 48 of the Electricity (Supply) Act, 1926. (My personal views do not necessarily represent the considered opinion of the Council.) The underlying intention of Section 48 of the Act was to confer trading powers upon those undertakings which did not already possess them. It was believed that the inclusion in the Section of an agreed clause, which in a considerable measure was made possible by friendly compromise between the Electricity Supply Authorities and the Electrical Contractors' Association, would dispose of the long-outstanding differences that unfortunately existed between them and obviously retarded greater development, and would have enabled the Committee to achieve in the course of a year definite progress towards the realisation of some common basis for giving effective assistance to the Industry. In my opinion, however, the results to date can only be regarded as almost negative in character, for it appears to me that beyond confirmation of an agreed working constitution little has been done; indeed, it can scarcely be claimed that the Committee is yet in agreement as to its main functions and the duties presumably imposed upon it by the Section.

I hold the view that at least one cause for this lack of progress is the disinclination of the contracting interests to give full effect within the Committee and outside to the definite intentions which were clearly conditions precedent to the acceptance of the Section. I submit that whilst it is true that the operation of the Section places upon local authorities definite statutory obligations to which they must conform, but which are not obligatory upon the contracting interests, it is unreasonable for the latter, as a party to the agreement, to be unwilling to recognise that there is at least a moral obligation upon them to observe, so far as possible, a similar basis in their commercial operations. I am glad that within the Committee now there is apparently a disposition to recognise the necessity for so doing. At the same time, there is evidence that some local authorities also are not yet prepared to give effect to the provisions of the Section. Whether this attitude is in any way influenced by the indirect action of conflicting interests within the areas of such local authorities is a matter of opinion, but there are those who hold the view that such is the case, and I will leave it at that. It is difficult to give helpful advice unless there is in the first place an agreed policy and a clear and definite understanding within the Committee upon which is imposed the duty of giving the advice.

Is not the record of progress so far made by the Electricity Commissioners and the Central Electricity Board, and by those associated with them in the practical formulation and construction of the national scheme, more a matter for commendation than for criticism?

It is evident that the area remaining to be dealt with is, comparatively, more sparsely populated, and it may be inferred that the practical commercial problems involved will be more difficult of solution.

Whether the political assurances of cheaper electricity are likely to be realised within the next few years, if at all, is a matter upon which there is a considerable difference of expert opinion. I venture to express the view that such results are not possible of complete realisation until legislation has also been enacted upon a collateral basis for the whole system of distribution. It is the cost of distribution which is the principal factor governing the price of electricity to the ordinary domestic consumer. On a recent occasion the "Grid" was aptly described by a member of the Central Electricity Board as a great adventure, and probably there is much truth in the observation.

It is now becoming a definite conviction that however much the Act might assist in the securing of economic generation, it cannot alone solve the problem of the provision of an ample and economic supply throughout the country. As municipal authorities we are rightly proud of the fact that more than half of the electricity supply industry is being municipally financed and developed successfully under municipal control and administration, and that to-day it can be shown, generally, that the municipal system has resulted in the provision of adequate supplies of electricity at more economic rates than, for the most part, obtain under private company enterprise and control. Will this condition necessarily continue?

Encouraged by Parliament, authorised undertakers are greatly extending their areas and obtaining the control of electricity supplies in those areas, and to facilitate this policy further Acts are from time to time being passed and Special Orders granted. Is it reasonable to assume that the existing system of local-authority control is fitted to administer the business of electricity supplies in such largely increased areas, much of the business perhaps being far removed from the centre of the local authority's direct interests? In considering upon what terms and conditions an electricity supply should be given in a particular part of an area, will not the local authority responsible for providing the supply be disposed to have more regard to the financial liabilities incurred by carrying out its statutory obligations, and to the beneficial results which may accrue to it, than it may be disposed to have to the requirements and interests of those demanding supplies in the extended areas? In other words, will the local authority always be able to consider the question in a strictly impartial manner and have proper regard to the requirements of the potential consumers?

Moreover, the local authorities responsible for financing schemes for the provision of electricity supplies in these extended areas are naturally disposed to have considerable regard to the views of those in their own area who provide the security for the loans which the local authorities raise in order to afford the supplies in the extended areas, for local authorities have to consider, not shareholders, but ratepayers and local politics. It is, perhaps, not surprising that these factors make it exceedingly difficult for local authorities to hold that detached view and act always in that impartial manner necessary to a right consideration of the question. There is, again, the disadvantage of ever-changing representation on the local Councils, making continuity of policy difficult.

A further consideration is the disinclination to accept the ordinary commercial risks attendant upon schemes of development that in the early stages must clearly be non-productive (this statement applies equally, or more so, to private enterprise) with the result that those parts of their areas have remained absolutely undeveloped. To deal with some of these areas distribution companies (financed to a great extent by American capital) are now being formed with the object of acquiring operating powers in such areas, no doubt realising that the national scheme will provide a ready means for obtaining the necessary bulk supplies to meet the potential

demand upon economical terms to themselves, and, let us hope, economical terms to the consumers.

At the present time 667 authorised undertakers are independently exercising their powers as distributors of electricity under two alternative methods of organisation and control; both methods have their distinct advantages and disadvantages. Now we know that whilst all these authorised undertakers will, within a comparatively short period, only be able to obtain their supplies in bulk through the Central Electricity Board, each individual undertaker will still retain its autonomy as a distributor in matters of policy and administration, in methods of charging for its supplies, and the rates to be charged, restricted only by the statutory maximum and the common law of supply and demand. With a continuance of the present system, therefore, it is conceivable that the benefits which should accrue from the national scheme of generation and main transmission may be definitely limited in extent, because of the absence of a really co-ordinated scheme of distribution upon some national basis as broad in its conception and as practical in its application as the national scheme of generation and main transmission.

So far I have referred only to the difficulties attaching to the greater development of electricity supplies under the existing systems of control and administration. There are also, of course, equally predominating difficulties in securing under present conditions a comprehensive and co-ordinated technical scheme of distribution. Some of the technical considerations which ought to be dealt with on a co-ordinated national basis are, I suggest, the right uses of extra-high-voltage and high-voltage feeding, the confining of direct current areas, the proper superimposing of alternating current distributing systems, the prevention of the use of inadequate mains, the construction of overhead schemes for outlying suburban areas, the provision of industrial and domestic apparatus, the standardisation of methods of charge, and the extension of electricity supplies in rural areas, &c. Good advice is useful, but if it is not going to be taken it is a waste of time and thought.

Is it possible for all the existing interests to be merged into a comprehensive scheme working upon a unified basis of policy, administration and technical direction, and under a central governing control whose aim would be the rationalisation of the electricity supply industry? I mean, not the creation of a monopoly, or the maintenance of prices, nor the extinction of public and private enterprise, as such, but rather the setting up of a community of interests to regulate and develop the electricity supply industry to the fullest extent possible under the most efficient and economical conditions. Such a scheme is possibly within the bounds of practical politics.

In the first place it is perhaps necessary that the business of distribution shall be handled by administrative bodies of increasing size, controlling greatly extended areas, but whether these bodies should be controlled municipally, or by private enterprise, or jointly, is beyond the scope of this address. With such a large proportion of the industry already under municipal control, municipally financed and administered, the municipal position in any such scheme as I foreshadow must be safeguarded. Their right to a general control over their own affairs must be retained, but supplemented by greater freedom and permanency of operation, which is essential in any scheme of development upon national lines. It is obvious, also, that the whole question of affording electricity supplies must be taken out of the realm of local politics.

A similar scheme is already being studied, and in a limited degree tried out, in Germany. The scheme now in operation for the generation and distribution of electricity in Berlin and in a very large outlying area, embracing directly and indirectly all the interests to which I have previously referred, is in the hands of a central controlling body, the Berliner Städtische Elektrizitätswerke Aktiengesellschaft, designated BEWAG. Its status is, in effect, that of a holding company, but all the shares are held by the municipality of Berlin. Its administration is in the hands of a Board of Management, which is assisted by a Supervisory Board consisting of municipal representatives, technical experts, and representatives of the workers. The business of the Bewag is the development of electricity supplies, including distribution, and the provision of electrical apparatus for industrial and domestic purposes, the latter a very essential consideration. There are also two other operating companies which work under agreement with the BEWAG and administer the business of electricity supply within their own areas. I am advised that the scheme is proving itself to be a practical solution of the problem of a real development of electricity supplies upon a co-ordinated basis, and the scheme indicates a possible direction of thought in respect to our own problem.

The national scheme in the Irish Free State under the direction and control of an Electricity Supply Board is pure nationalisation, and quite recently this fact was officially confirmed by Mr. Cosgrave. However, what is required in this country is not nationalisation, but rationalisation; the Irish Free State system is referred to merely as an instance of an attempt by others to solve the same problem as lies before us. The rationalisation of industry may not yet be so clearly understood as it should be, even by some who advocate its necessity. Rationalisation can only be permanently beneficial if the aim is to increase consumption by cheapening production and lowering prices, and from the community's point of view the problem involved is how to gain all the benefits of a large-scale organisation and the highest possible efficiency in production and distribution, whilst avoiding the evils of monopoly and State control.

Whitleyism in the Electricity Supply Industry from a Management Point of View.

By Ald. W. WALKER, M.I.E.E., M.I.Mech.E. (*Abstract*).

The first year associated with the idea covered by the term "Whitleyism" is 1908, because before the name itself was even heard of the initial step was the appointment by the House of Commons in that year of a Select Committee to inquire into the question of "sweating," as raised in a report of a Select Committee of the House of Lords. The Committee recommended the formation of Wages Boards with powers to fix minimum rates of pay, and it was owing to this that the Trades Boards Act of 1909 was passed. In 1916 the Government appointed a Committee under the chairmanship of Mr. J. H. Whitley, M.P. (later Speaker of the House of Commons, and it is from his name that the term "Whitleyism" is derived), which issued four reports, the particular one to which allusion is generally made being an interim report dated March 18th, 1917, containing the statement that "In the interests of the community it is vital that after the war the co-operation of all classes, established during the war, should continue, more especially with regard to the relations between employers and employed. . . . With a view to providing means for carrying out the policy outlined above, we recommend that the Government should propose without delay to the various associations of employers and employed the formation of Joint Standing Industrial Councils in the several industries, composed of representatives of employers and employed, regard being paid to the various sections of the industry and the various classes of labour engaged. . . ." The whole scheme was to be voluntary.

In 1921 the electricity supply industry decided to set up thirteen District Joint Industrial Councils, covering the whole of the United Kingdom, each Council to consist of 24 members, 12 representing the employers and 12 the Trade Unions. Employer members were to be elected by the municipal undertakings and the power companies operating within the area. Trade members were to represent those Trade Unions to which belonged the bulk of the workmen employed in the undertakings within the area. The National Joint Industrial Council was to consist of a maximum of 52 members, 26 to be employers and 26 trade unionists. Thirteen of the employers were to be elected by and from the municipal members serving on the District Councils, and the 13 company members of Council were to be nominated by the power companies Association. The trade union members were to be elected by the national executives of those Trade Unions which were represented on the District Joint Councils. They were the Amalgamated Engineering Union, the Electrical Trades' Union, the National Amalgamated Union of Enginemen and Firemen, the National Union of General Workers, the Transport and General Workers' Union, the Workers' Union, the Associated Blacksmiths and Ironworkers' Society. There have been slight variations from this list owing to amalgamations, &c.

The National Joint Council delegated to each of the District Councils the important duty of negotiating a schedule of conditions of work and rates of pay for its own area. The National Joint Council tried to secure some co-ordination and equality between the schedules for the different districts, but found it to be a difficult task. The conditions and wages having been settled by agreement, every workman could know what the conditions were under which he was engaged and the employers, as a whole, wished to make their men comfortable. A test of the value of the agrement to the industry has been the absence of critical disputes and stoppages and a general improvement in the relationship between the management and the men. Means of dealing quickly with anomalies were provided by each District Joint Council appointing eight members (four from each side) as sub-committees, which have proved extremely useful, as they have been able to adjust many matters reported for attention without taking up the time of the District Council beyond that necessary for confirmation. The duty of the National Joint Council has been to co-ordinate the work of the District Joint Councils and all questions and claims of a national character.

Work Done.—The first departure from the programme of leaving to each of the District Councils the negotiations for the alteration of wages was in 1920, when the N.J.C. recommended a general increase of wages for all grades of workmen within the schedule by two stages of 3s. each. In 1921 the N.J.C. arranged for two reductions to take place of 3s. each, and for stabilising the rates after the reduction until November, 1921, when a Negotiating Sub-Committee of the N.J.C. submitted to the full Council a draft agreement regarding wages which was unanimously accepted. This established the principle of a sliding scale of wages based on a datum figure of 120 per cent. above an adjusted rate for 1914 and varying up or down in accordance with the Board of Trade index figure of the cost of living. It provided for an increase or decrease, respectively, of ½d. per hour for every complete six points calculated from the datum figure. This also was a national agreement. In 1922 the employers' representatives on the National Council proposed "... that in lieu of the existence of a sliding scale agreement a variation be made on the basis of taking the actual basic rates of each district (as shown by the schedule) and adding thereto the cost of living figure . . ." and agreement was reached in 12 out of the 13 districts, the odd one going to arbitration. Although since the cost of living figure has begun to fall there have been allegations made

against its fairness, there has never been anything better suggested.

Another scheme put forward by the workmen's representatives, both on the District and National Councils, was for grading undertakings according to the capacity of plant installed. Instead of such an *ad hoc* method, recommendations were made by the National Council and signed by every member of the sub-committeee in favour of additions to the schedule rates of pay to certain specified workmen when appointed by the management to take up duty on new large units. The idea was to provide additional pay for the leading man engaged on the larger units. When the report came before the National Joint Council for confirmation some of the Trade Union representatives, including those who had served on the sub-committee and who had signed the report, were instructed not to vote for it on the ground that it did not give an all-round advance to the whole of the men in the station. On other occasions the failure of some of the Trade Union representatives on the District Councils to accept responsibility has been equally marked, and it is certainly a matter for serious regret that after prolonged negotiations recommendations are turned down by some other set of persons whom the employers have not met and who have not heard the arguments and facts which led up to the decision. It is a serious handicap, but one which it is difficult to remove.

Another claim which took up a large amount of time and led to two references to the Industrial Court for decision was for an increase of the schedule rates for shift workers, as shift workers, although it was well known to those who took part in the making of the schedules that all matters relating to the conditions of shift working were borne in mind by both sides and due regard paid to them, so that the rates were consolidated rates. The Industrial Court on both occasions decided against the claim for extra pay.

Thus, should an increase in the size of a station or other circumstances make it necessary, in the opinion of the management, to change a job which has hitherto been done by day workers into a shift job, it may do so by giving seven days' notice, after which the men can be put on rotating shifts without additional payment, but subject to the conditions as regards holidays, meal-times, &c., of shift workers.

The most critical event since the introduction of Whitleyism into the industry was the general strike of 1926. Despite agreements, and without having regard to the good feeling and amicable relationship which had existed between the two sides, certain Trade Unions represented on the N.J.C. broke their agreements and tried their utmost to involve the industry in the general stoppage, but the majority of the workmen and the whole of the staff in the industry stuck loyally to their jobs and refused to be stampeded. Owing to what had happened the employers refused to continue their association with the N.J.C. until some guarantees could be given by the Trade Unions, and finally a series of resolutions regarding the constitution of the N.J.C. were agreed to, in accordance with which nothing in the nature of a "lightning stoppage" can now take place, as any dispute must be referred to the District and/or National Councils, thus giving time for consideration and adjustment if possible; and undertakers have the right to require that each employee shall sign an agreement that his service is in accordance with the terms and conditions agreed by the National and District Councils. The employers having come to a new arrangement with the Trade Union side, carried out the spirit of the agreement to the full, and the Trade Unions desired strongly to preserve the District and National Councils.

In 1928 the Trade Union representatives on the N.J.C. gave notice to the employers that it was their intention to ask for a *revision of the sliding scale*, and this description of their intended claim was used in all subsequent discussions and correspondence. The surprise of the employers may therefore be imagined when they received, a day or two before the September meeting of the N.J.C., a letter from the secretary of the Trade Union side giving notice to *terminate the agreement*, together with claims for a 10 per cent. increase of all wages, double time for Sundays for shift workers, increased holiday and sick-pay allowance, and increased wages and improved working conditions for certain specified grades. The employers resolved unanimously to resist the application, and also to give notice of an application for a decrease of one penny per hour, which, it was urged, was fully justified and overdue.

As a result a national conference of workmen's representatives resolved that the notice to terminate the agreement should be withdrawn; the agreement of December 17th, 1927, was continued and extended for 12 months ending December 21st, 1929, and the employers did not proceed with their application for a reduction.

The remaining claim was that the grades of switchboard and sub-station attendants and assistants should receive material increases in wages and be given conditions, such as holidays, sick pay, &c., similar to those granted to the technical staff. It was a demand that all workmen of the grades mentioned in the Trade Union claim, whatever their training or status, should be classified as engineers and also as members of the technical staff, and the unreasonable nature of such a claim was argued by the employers. Eventually this part of the claim was modified, and there was general agreement that as regarded the remainder it was desirable to define the line of demarcation between the technical staff and the workmen, so that the causes of friction on this head could be removed. The draft heads of agreement on demarcation were accepted on March 14th last, and are now awaiting incorporation in the general report on the whole of the claims. The clauses are:—

> "Employees engaged as sub-station attendants and switchboard attendants shall be subject to the conditions and schedules of the National Joint Industrial Council,
>
> "*Unless* they have a supervisory status and are engaged on supervisory duties; or are responsible for the control of load distribution; or control sub-stations other than the one in which they are actually engaged; or who, for a temporary period of their training as technical engineers, are engaged on a switchboard or in a sub-station.
>
> "The number of trainees working as switchboard attendants or as sub-station attendants shall not at any time exceed 25 per cent. of the total number of switchboard and sub-station attendants employed at that time."

This out of the way, there was left only the question of increased remuneration as set out in the schedule which formed part of the claim. The claims sought to establish a scale of pay for the grades of men in question very much in advance of anything which had previously been paid, and substantially more than was being paid to qualified engineers who had supervisory duties. This case is included, so far as it has gone up to the time of the paper being written, as an example of the difficulties which are constantly being created by the demand for alterations in the terms set out in the agreement. The employers know the deep resentment which would be aroused in the minds of their principal consumers if the already good wages and conditions in the electricity supply industry were increased, as it could only be done at the expense of the depressed industries. Therefore, the employers are compelled to examine every claim very carefully and to refuse all those which they consider to be unjustified and which would alter radically the existing agreements.

There is one feature of the many claims to which it is not unfair to draw attention. The Trade Union representatives making them have in nearly every case a small proportion only of their members employed in the electricity supply industry, the greater number being engaged in other industries. Agreements governing the conditions in these other industries have been negotiated and signed by the same representatives who serve on the Councils in the electricity supply industry. In the case of the former industries they have made agreements embodying lower rates of pay, no holidays, and other conditions generally much less favourable than those for the electricity supply industry, yet their main efforts appear to be concentrated on getting more still from the electricity supply industry, instead of trying to bring the others nearer to that standard. In other words, they are attempting to increase the advantages of the already favourably placed, but small proportion, of their membership, thereby increasing the wide margin between the two sections of their members, although it is manifest that the cost of the alterations would have to be borne by the depressed industries and would react to the disadvantage of the men employed therein. That the privileged position of the men in the electricity supply industry is realised by those outside is denoted by the great desire to transfer to it whenever an opening occurs. The management want to have contented men under fair conditions, but those conditions must bear a reasonable relationship to those operating in the principal industries in the area in which they are supplying and from which they derive their revenue.

The employers on both the National and the District Joint Councils represent both publicly-owned and company undertakings, and they are responsible to their ratepayers and shareholders, respectively, for managing their concerns in conformity with business methods. On the one hand, this has not been interpreted by the employers as an excuse for ungenerous treatment, or harsh conditions, as is proved by a comparison with those in other industries. On the other hand, it must deter the management from granting applications which they believe to be unjustifiable. Because the cost will fall upon outside persons is no excuse for acting contrary to what reason dictates. Those who have taken part in negotiations have been astonished by the incomplete knowledge of the principles of the administrative and financial side of management. Nothing has been more disappointing than to listen again and again to arguments based on ideas concerning the industry which, if actually practised by those responsible for an undertaking, would ruin it in the shortest period of time. When dealing with working conditions and labour the practical knowledge of the Trade Union officials has always been so useful that the revelation of a wrong conception of the other side of the industry was somewhat of a shock to the employers and a subject of general comment, as it seemed to explain so much. There is no implication of bad faith; the arguments and figures used to substantiate the applications were put forward in perfect good faith.

The author is certain from his knowledge of the employers in the industry that the great majority of them are anxious to have contented workmen, and are prepared to uphold conditions which are reasonable. They have always resented any attempt by an employer to depart from the spirit of an agreement, and have joined with the representatives of the men to get fair play in such cases. They are strong believers in the principle of the Industrial Councils and desire their continuance, but it is useless to deny that the numerous and far-reaching demands are raising doubts whether the organisation is not being used unfairly, and the managers of many undertakings are becoming restive. It is to be hoped that very careful consideration will be given by both sides before making any

proposal which will materially alter the schedule conditions and that the effect, not only on this industry, but also on the other industries concerned, will be thoroughly investigated.

Although a number of electricity committees have sharply criticised the holidays given under the schedule as being excessive, when compared with those in other industries, or even in other departments of the Corporation, the employers, as a whole, have, on the one hand, declined to support any attempt to obtain a reduction; on the other hand, so far as can be judged, there would be strong opposition to an increase at the present time, especially as the cost would have to be borne by those industries which have no holiday arrangements at all, and are suffering under great depression. A plea had been made that six consecutive days' holiday does not allow a complete week-end, therefore that only short journeys can be made and that the Saturday is lost. To meet this a suggestion was made by the author to a meeting of employers that the public utility services might consider a uniform scheme for holidays for inclusion in the national agreement:—"After 12 months' continuous service each man shall be allowed an annual holiday of ten consecutive days made up on the following basis:—He shall commence his holiday as from stopping time on Friday night and shall return to work on the second Tuesday morning thereafter, and shall be paid for all normal working hours (*i.e.*, 60 hours) falling within that period." This was not discussed, however, on its merits because at the time the Trade Unions were about to table other claims, which they were not prepared to withdraw. Expressions of opinion on this suggestion will be appreciated.

Future Considerations.—The foregoing account of some of the many questions which have been brought before the National and District Councils will be useful for reference. For discussion, however, it is suggested that consideration of the future working of Whitleyism in our industry should be given the first place, and in the forefront should come the question of whether, and if so to what extent, wages and conditions of employment should be dealt with under national agreements instead of separate district settlements. It appeared quite sound, at the beginning, to leave all negotiations for setting up schedules of wages in the hands of the District Councils, but there has been a continuous series of attempts to alter materially the conditions set up under the agreements. If the whole of the claims had been granted, the schedule would have been drastically changed, and employers in some areas have agreed to changes apparently because they appeared to affect only a few men in their particular district, forgetting that they might have a much greater effect in other districts. These features have proved to be as unsatisfactory as they were unexpected.

Many discussions have taken place in the District Councils concerning claims which were obviously of national importance, because of the effect they would have had on the whole industry. It is disconcerting to find how great are the differences between district and district which have been brought about by this detached and water-tight deliberation; for what may be called "key grades" of men, the increase in wages paid in 1928 above what was paid in 1914 ranges from 91 to 130 per cent.; from 71 to 107 per cent.; from 83 to 121 per cent., and so on.

On matters of conditions of employment a similar policy has worked out the same way. Serious consideration must be given by employers to this problem. The writer offers the following suggestion:—First, that any claim which would, if established, substantially alter the existing conditions and would appear to be a radical departure from those ruling in other districts, should be made to the National Joint Council; secondly, that a central organisation should be set up in charge of a thoroughly competent industrial officer who would keep complete statistics of all wages and conditions of employment, both of our own industry and of industries generally. This officer and his department would be at the service of the representatives of all the districts and of all employers' secretaries and committees, so that information on every phase of a claim would be readily circulated. It would enable the local employers to have before them reliable figures of wages paid to similar classes of men in the principal industries within their own district, and by our own industry in other areas. It would include all former decisions, if any, on the matter at issue, and the personal services of the chief officer at any conference, or in connection with arbitration proceedings, or reference to an industrial court. In other words, our industry would be brought into line with other industries, both privately and publicly owned; I need only cite gas and tramways as instances. The services of such an officer would be invaluable to the employers, who are finding their work most onerous, and must, in the author's opinion, either be granted special aid, or become inefficient. It is not realised that whole days have to be spent in examining a claim, calculating the cost of allowing it, whether it is equitable and how it conforms with the practice in other industries, marshalling the facts and arguments, and then carrying on the negotiations. The knowledge throughout the industry that a thoroughly efficient organiser was behind the National Council would automatically increase its prestige and probably have the effect of bringing in the undertakers which are at present outside the organisation.

Many of those actively employed in the work of Electricity Committees and District Councils do not realise the importance of the industry nor the financial issues involved. The annual wage and salaries bill published by Commissioners for 1925-6 was £7,979,000. Assume the present total cost of wages and salaries to be about £8,000,000; 1/10th of 1 per cent. (or 2s. per £100) in wages per annum would produce £8,000 per annum. The ascertained number of manual workers and staff is 43,042 (say, 43,000) and $\frac{£8,000}{43,000}$ personnel equals 3s. 9d. per employé per annum. The average Trade Union subscription is 8s. 4d. per annum, or 2d. per week (for protection organisation only, excluding special benefits); also with the subscription of the staff members, *i.e.*, £4 per annum (E.P.E.A. spends £12,000 per annum).

The Commissioners have sanctioned various amounts up to 11s. 6d. per man per annum for subscriptions to the Council and Board, thus making the figure of 3s. 9d. appear very low. On the estimated figure of 43,000 (staff and manual workers) 1d. per hour for one week would produce £8,510, and a sum of, say, £9,000 per annum would be a modest figure for the cost of National and District organisations for both the Councils and Boards. Probably the only equitable scheme would be for the Districts to raise subscriptions based upon the number of employees, the figures to be ascertained, say, every three years. The present figures are (workmen only):—

District No.	Area.	No. of employés.	Percentage to total.
1.	North-East Coast	2,445	6.20
2.	Yorkshire, North Lincolnshire, &c.	4,798	12.17
3.	North-Western	8,008	20.31
4.	South Wales	1,100	2.79
5.	West Midlands	3,065	7.78
6.	West of England	1,089	2.76
7.	East Midland	1,639	4.16
8.	East Coast	941	2.39
9.	Home Counties	2,353	5.97
10.	London	8,828	22.39
11.	South Coast	1,559	3.96
12.	Devon and Cornwall	710	1.80
13.	Scotland	2,887	7.32
	Totals ...	39,422	100.00

The author also suggests for discussion the question of making the areas of the District Councils coincide with the electrical areas set up, or to be set up, by the schemes of the Central Electricity Board, which would, if Scotland remains as one district as at present, reduce the number of District Joint Councils from thirteen to eight and carry with it the advantage of bringing all the workmen within each area under the same rates of pay and conditions of service.

Of the many questions of principle which still require solving, one is whether or not the decisions of an Industrial Joint Council should be compulsory on the industry. The employers have always said they were prepared to adopt this as part of the constitution, but they would make no move until the Trade Union side intimated that it wished the question to be discussed. The question was advanced by the vote in favour at the Trades Union Congress at Scarborough. When it is remembered that by the constitution governing our National and District Councils no resolution can become operative until it has been approved by a majority of both sides of the Council, there does not appear to be any insuperable objection to making the findings compulsory. The attitude of the Ministry of Labour throughout (whatever the Government in power) has been one of benevolent neutrality.

As long ago as 1912 a committee under the chairmanship of Sir George Askwith was directed by the Government to ascertain what was the best method of securing the due fulfilment of industrial agreements, and an agreed Bill passed its second reading in May, 1924, but it was not possible to proceed with the measure owing to political conditions; it awaits re-introduction, and its prospects are not rosy unless it can be given Government support. Whether or not support from the electricity supply industry should be given to the Bill is a matter for each side of the Industrial Councils to consider separately, and then, if agreed, joint action could be taken. It is important to note that even if the Bill became law it would not be compulsory for any industry unless adopted by a resolution of the two sides forming the Industrial Council for the industry; therefore it does not appear to be in conflict with the claim for self-government by the industry, and it would certainly prevent a small minority within an industry keeping the whole in a state of unrest.

The author suggests that such a measure is the logical outcome of the Whitley scheme. It provides a means for healing the sore caused by a few concerns refusing to conform to the conditions under which the remainder have agreed to work, whilst at the same time the safeguards against tyrannical use are ample.

Joint Boards.—The other application of Whitleyism to the electricity supply industry is that of the National and District Joint Boards for dealing with all matters relating to the technical staff. A salary scale has been arranged and conditions of service agreed, being national in extent. The industry has to look to the trained staff for its future technical leaders, and it is most gratifying to know that the organisation under the control of the Joint Board has been completed by a scheme of training for power-station engineers which, it is hoped, will provide a sufficient number of properly trained men to meet the requirements of the industry. The trainee must, on the completion of the course, pass the examination for Associate Membership of the Institution of Electrical Engineers in order to qualify for registration.

A pleasing aspect of the National and District Boards is the

smoothness with which they are working. Arbitration is assured on any matter of whatever nature which the District Joint Boards have failed to settle.

As a result of changed and changing conditions brought about, or to be brought about, in connection with generation by the schemes of the Central Electricity Board, and the changes in the problems and methods of distribution, it has been realised for some time that an alternative way of fixing the basic salary would have to be found, as the present method does not meet the altered conditions. Both sides have been considering the problem separately, and the E.P.E.A. has prepared a draft schedule and the employers are now engaged in examining it in the light of their own ideas on the subject.

Some Notes on Recent High Court Cases and Current Legal Problems in Connection with the Generation and Supply of Electricity.

By JAMES H. ROTHWELL, C.B.E., Honorary Solicitor.
(*Abstract.*)

The legal cases of importance recently decided are as follows:—

Farnworth *v.* Manchester Corporation. This action was first tried at the Manchester Assizes, and upon the plaintiff's appeal was heard by the Court of Appeal in December last. The case will probably be taken to the House of Lords.

The plaintiff, Mr. Arthur Farnworth, is a farmer owning property in the neighbourhood of a large electrical power station erected by the Manchester Corporation under powers of a local Act of 1914 at Barton-on-Irwell, and he brought an action against the Corporation claiming an injunction to restrain them from so working their electricity power station as to commit a nuisance by emitting fumes heavily charged with sulphur and sulphur compounds to the damage of property which he occupied, and from interfering with his comfort and health. He also claimed compensation for the damage caused to him.

The Manchester Corporation admitted the nuisance, but contended that, as the power station was of the precise kind which Parliament had authorised, the plaintiff could not succeed in his action, as the local Act, so far as it authorised the construction of the power station, did not incorporate the usual "nuisance" clause which provides that a Corporation is not to be exonerated from proceedings for nuisance.

Mr. Justice Talbot held that the defendants had succeeded in showing that the station was of the kind which Parliament had authorised to be built at the place in question, and that no means which science and knowledge could suggest could have avoided the nuisance complained of. He accordingly gave judgment for the Corporation.

The Court of Appeal by a majority of two to one reversed this decision, so that at the moment there are two legal minds in favour of the Manchester Corporation and two in favour of Mr. Farnworth.

Lord Justice Scrutton said that it was clear that the station, in using the coal which it did use, discharged such a quantity of sulphur that the fumes, which were mixed with moisture, were not dispersed in the atmosphere, but descended on Mr Farnworth's land, and in view of the fact that larger stations were being erected, *e.g.*, at Birmingham, and were likely to be erected on agricultural land, the legal incidence of the damage was of great importance. The fact that a generating station on the land was authorised by Parliament, and that it was worked without negligence, did not, when there was a nuisance clause in the Act or Order, relieve the undertakers from paying compensation for damage done amounting to a nuisance. Lord Justice Scrutton was of the opinion that the "nuisance" clause was incorporated in the Local Act of 1914.

His Lordship further stated that the Corporation never seemed to have considered when that station was built, to be worked on a larger scale than had ever been done before in England, what would be the effect of so large a quantity of sulphurous fumes on the surrounding neighbourhood. It was a striking fact that no similar damage was known in any other case, and the Corporation was unable to explain why it alone should cause damage.

The only conclusion one can arrive at at this stage is that in order to resist an injunction or damages for such a nuisance as was proved in this case, the undertakers must prove to the satisfaction of the Court that it is the inevitable result of operating a generating station that it should damage adjoining agricultural land by sulphur deposits, notwithstanding that they may have taken all reasonable precautions to explore the cause of and remedies for that damage, or adopted all reasonable precautions to prevent it.

It is interesting to note that the operation of the injunction was suspended for a year to enable the defendants to adopt measures to terminate or mitigate the nuisance.

Lord Justice Scrutton also made this significant remark: "The case showed the necessity for Parliament and other authorities concerned giving more careful attention to the provisions for compensation for damage caused by those enormous developments of electrical power stations. Promoters should not be allowed, by abstaining from asking in express words, for the exclusion of any duty to make compensation for damage done—a privilege which in his judgment they would not get if they had asked for it expressly—to argue afterwards that their duty to compensate had been indirectly excluded by obscure inferences."

The second case is that of the Attorney-General *v.* London and Home Counties Joint Electricity Authority.

By a scheme made by the Electricity Commissioners under the Electricity (Supply) Act, 1919, a Joint Electricity Authority was constituted as the Joint Electricity Authority for London and part of the Home Counties. The scheme did not transfer, as presumably it might have done, to the defendants any of the powers of local authorities to take over electrical undertakings; but the scheme did give the Joint Electricity Authority power to promote Bills in Parliament for the purpose of the scheme. The Joint Electricity Authority prepared a Bill which purported amongst other things to transfer to it the powers of local authorities to take over electrical undertakings within its area. The defendants had no income other than the contributions by the owners of electrical undertakings within their area. Four electrical undertakers within the area applied in February last to the Chancery Division for an injunction to restrain the Joint Electrical Authority from applying any of their funds towards the costs or expenses incurred or to be incurred in relation to the preparation of this Bill, and to restrain them from employing any of their officers or servants in the preparation and promotion of the Bill until the authority should be authorised by Parliament so to do.

Mr. Justice Astbury came to the conclusion that the Joint Electricity Authority had no power to employ its funds for the promotion of the Bill in question. When limitations were imposed by a scheme it was not "for the purposes of the scheme" to promote a Bill to get rid of those limitations, or to acquire powers for the purchase of those undertakings when those powers had been deliberately withheld.

The next case of general interest is G. Scammell & Nephew, Ltd., v. Attlee and others. The plaintiffs in this case brought an action against seven individual members of the Electricity Committee of the Stepney Borough Council, claiming from the defendants damages for the effect of an alleged conspiracy whereby in breach of a contract the supply of electricity for power was unlawfully cut off from their premises during the General Strike in May, 1926. The plaintiffs succeeded in the court of first instance, but the defendants appealed successfully, and judgment was entered for them with costs.

The important point of general interest which emerges from this case is that where a defendant, whether he be an individual member of a committee or council of a local authority, or an official of the local authority, pleads the six months' limitation imposed by the Public Authorities Protection Act, 1893, as the period within which an action must be brought in respect of his conduct, the plaintiff can defeat that plea by proving on sufficient evidence that the defendant was not really intending to act in pursuance of his statutory authority, but was using his pretended authority from some improper motive, such as spite, or for a purpose entirely outside statutory justification.

Where defendants were purporting to execute a statute, as in the case in question, the burden of proof is on the plaintiffs if they allege the existence of a dishonest motive and the absence of any honest desire to execute the statute, and such existence and absence will only be found to be proved on strong and cogent evidence.

On the facts of the case in question, the Court of Appeal held that there was no evidence on which the jury could find that the members of the Committee were not intending to carry out their statutory duties when they determined to get a supply of light by sacrificing a supply of half the power.

Lord Justice Scrutton said: "I think the members of the Committee made a mistake in not, at any rate, making more inquiry about the Government supply of men and protection, and very likely they showed a lack of courage. But mistakes may well be made, and a weak action may well be taken in the intended execution of the statute, without dishonesty or lack of good faith. The necessity for action was urgent, the risks of danger serious, and the Committee took a view that they could best perform part of their duty by abandoning part. I may disapprove their decision without convicting them of dishonest pretence, of which I see no evidence."

As the writ was issued more than six months after the matters complained of, the defendants were protected by Section 1 of the Public Authorities Protection Act, 1893.

The last case referred to is that of the Caerphilly Urban District Council v. Griffin, decided in December, 1927. The plaintiffs, a local authority empowered to supply electricity, sought an injunction under Section 23 of the Electric Lighting Act, 1909, to restrain the defendant from supplying electricity to certain consumers in the area. By that section the plaintiffs had a monopoly in the area, subject to the proviso that "this monopoly should not prevent any company or person from affording a supply of electrical energy to any other company or person where the business of the company or person affording the supply is not primarily that of the supplying of electrical energy to consumers."

The defendant in the case had primarily two businesses. In the course of those businesses the defendant provided plant to light his shop and residence, and he afforded a supply of electricity to one of his shops which he had leased to Messrs. Woolworth, and also to a covered market for the purpose of attracting tenants and developing his property.

The Court held that the supply of electrical energy in this case was only incidental to the defendant's two businesses, and was not his primary business. The action therefore failed and was dismissed.

It is interesting to note that even with these limitations electrical undertakers have a greater monopoly than have gas and water undertakers. The main protection to gas and water undertakers is not any specific monopoly clause, but the fact that an unauthorised undertaker cannot open the highway for the purpose of laying mains to supply gas or water. A general impression prevails that an unauthorised undertaker may do this with the consent of the road authority. Such is not the fact. A road authority who permits such an unauthorised disturbance of the road service is liable to proceedings by way of indictment as well as the unauthorised undertaker, and would be liable to action by any third party as the result of any damage caused to that third party in using the road.

It must be borne in mind, of course, that this same protection of non-disturbance of a road surface is available to protect electricity undertakings, such as the one referred to in this case, from private persons spreading their competitive activities too far under the cloak of the supply of electricity not being their primary business.

If undertakers choose to alter their system, frequency or pressure for their own purposes, the interests of consumers must be adequately safeguarded, but the form of consent to the alteration given by the Commissioners might be improved without injustice to consumers. The expense involved in replacing d.c. wireless apparatus with a.c. apparatus is altogether disproportionate to the amount received in revenue, and there is also the possibility that some persons might seek to gain some personal financial advantage out of the impending change.

The Commissioners have a somewhat free hand to modify their consent; and the measure of control which undertakers have by statute over apparatus connected to their systems would appear to entitle them to insert in their agreements with consumers a clause requiring notice to be given before any new apparatus, other than lamps, is connected to the supply. The undertakers could not reject any intended apparatus which would not be likely (*a*) to cause damage, (*b*) to interrupt the supply to other consumers, or (*c*) to cause the consumer to exceed his declared maximum demand. Moreover, no consent of the Commissioners can impose as a condition precedent to compensation a condition that apparatus shall have been approved.

It might be suggested that a further proviso should be added to the form of consent to the effect that if a consumer installs any apparatus after the date of the newspaper advertisement of the intention to apply for the Commissioners' consent to the change, such consumer shall not be entitled to require the undertakers to alter such apparatus or to pay compensation in respect thereof, if the arbitrator shall determine that the installation of such apparatus was not necessary or was made with a view to obtaining compensation from the undertakers.

A considerable amount of time has been devoted to settling a model hire-purchase agreement, and considerable care has had to be exercised to avoid the agreement being construed as one for sale and purchase. It would be an advantage if all undertakers who embark on the hire-purchase policy would adopt this model form of agreement with as little amendment as possible.

Section 12 of the Electricity (Supply) Act, 1926, has an important bearing upon existing and future supplies of electricity in bulk to other authorised undertakers.

Section 12 does not affect contracts entered into before the passing of the Act, and therefore, unless there is a clause in the agreement making some provision for variation of charges, the agreement must be left to expire or be determined before any modification can take place, except when the parties voluntarily agree to modify the terms.

The section will apply to contracts entered into since the passing of the Act, where there is a clause as to variation of prices as soon as the bulk supplier takes energy directly or indirectly from the Board. When this comes to pass it will be open to authorised undertakers who take the bulk supply to demand Section 12 prices, and in default of agreement to refer the matter to the Electricity Commissioners for their decision. Pending Section 12 coming into full force each undertaker must act according to the prices clause in the agreement.

As to contracts not yet entered into, it is competent for the contracting parties to arrange their own terms, but before doing so they should consider the model clauses which have been specially settled, having in view the early operation of Section 12.

In regard to the question of liability in case money is stolen from an electricity prepayment meter, only one case has been reported in the recognised Law Reports. This was a case of supply of gas by prepayment meter, but I conceive the position would be the same in the case of electricity. In the reported case the money was stolen through no negligence on the part of the consumer, and the Court held that the consumer by putting the money into the box had paid for the gas, and was not liable to pay again.

The Law Report does not indicate that there was any special agreement between the consumer and the undertakers.

I conceive that the liability would be the same in regard to damage to the meter where it is caused without negligence of the consumer, and in the absence of a special agreement.

In Brighton the application form which all consumers are required to sign contains the following among other conditions:—

> "Where the supply is through a prepayment meter, the consumer shall pay for all electricity registered by the meter at current rates, notwithstanding any insufficiency of prepayment, and, in addition, one halfpenny for every unit of electricity consumed, in lieu of meter rent. Should the meter be tampered with and money unlawfully extracted therefrom, the consumer shall make good the amount missing, and also pay for any damage which may be done to the meter, lock or fittings."

The reported case would not, of course, apply where a condition of this sort had been entered into by the consumer.

A point of financial interest has been considered arising out of a proposal to vote money out of the funds of the electricity undertaking for the years 1929-30 before the completion of the year when the reserve fund is not up to the required limits provided for in the 5th schedule of the Electricity (Supply) Act, 1926.

In this case a grant out of electricity funds before the completion of the year is not "net surplus" within the meaning of these words as used in the 5th schedule of the Electricity (Supply) Act, 1926. The power in this schedule is now the only one existing which enables an undertaking to apply money in aid of local rates; and it applies only to the net surplus, which of course cannot be ascertained until the end of the financial year, and if, after March 31st, 1930, the reserve fund does not amount to more than one-twentieth of the aggregate capital expenditure on the undertaking, the net surplus must go to the reserve fund until that condition has been fulfilled.

A somewhat technical problem arises in the carrying out of the South-East England Electricity Scheme, 1927. Under Section 8 of the Electricity (Supply) Act, 1926, the Central Electricity Board is to construct the main transmission lines required for the inter-connection of selected stations one with another, and with the systems of authorised undertakers in accordance with the scheme. Section 51 defines "transmission line," whilst "main transmission line" is defined by Section 36 of the Act of 1919.

Existing switchgear was installed by a corporation (whose station is a selected station) controlling its generating plant and outgoing feeders, and was designed to meet all requirements for years to come, but not in contemplation of a connection to a main transmission line of the Board's system.

Before the generating station is connected to the grid under the scheme, it will be necessary to install switchgear of much higher disruptive capacity.

The estimated cost of installing the necessary gear is upwards of £200,000, and it has been assumed that this expense would be borne by the Board, the gear being necessary for the control of the Board's transmission line within the meaning of Section 36 of the Act of 1919.

The Board, however, contended that the gear is required, not for the control of their line, but solely for the protection of the corporation's system, and in fact will form part of the corporation's system.

In the case of a selected station the financial result of this decision of the Board would not be serious, as the interest and sinking fund upon the extra capital expenditure would be borne by the Board under Section 7 of the Act of 1926.

It is for the technical experts of the Association to agree that gear of this nature, whether provided in a selected station or in connection with any system of an authorised undertaker (whether selected or not), is primarily "switchgear necessary to and used for the control of" the main transmission line within the meaning of Section 36 of the Act of 1919.

The I.M.E.A. Exhibition.

IN accordance with the usual practice at the I.M.E.A. Conventions of recent years, an excellent exhibition of electrical domestic apparatus is this year being held in the Old Torbay Hospital, Torquay, where some 38 or so manufacturing concerns and other organisations are displaying their products. The following are some notes on the exhibits:—

Included in the items on the stand of the BASTIAN METER CO., LTD., is the 1929 model Bastian patent water heater. This year's improvements are both in general design and detail. The heating element, which is now immersed in the water entirely, is made so that both the resistance and the containing tube are easily withdrawn, and as the deposit chiefly settles on the heating tube, a new one can be inserted at low cost and without taking down the heater. The loose lid also has the advantage that towels and linen can be aired on it. In the "W" types are fitted wall brackets and outlets at the bottoms for joining to existing piping. Mercury-break thermostats are fitted in types 800.

In the Mascarini steam boiler for a.c., type 320, the water itself acts as a resistor, and in consequence the apparatus is very safe, since, if the water supply fails, the boiler stops

working. The control arrangements are very neat indeed, and the boiler can be arranged automatically to take a constant load, to supply steam to meet demand, and to take surplus load from a network; for instance, as a motor is switched on or off the motor load would be given up or taken by the boiler, thus preserving a steady load on the supply.

Messrs. BELLING & Co. are showing a new series of electric cookers with all-metal boiling plates and a new boiler-griller plate with an all-metal top. The "Baby Belling" cooker, is also on show, as is a number of electric immersion heaters suitable for fitting into any existing tanks or cylinders, and for use in conjunction with ordinary domestic hot-water systems. New sizes have been introduced, so that the range now offered covers all sizes of tanks or cylinders, and the loadings range from 250 W to 3 kW. Practical demonstrations are given of the new "Parmotor" relay which is designed for automatically controlling electrical circuits, and is claimed to be more reliable, more flexible and cheaper than a time switch. It has a very wide application, including the thermostatic control of electric water heaters, cookers, electrically-heated rooms, street-lighting control, shop-window lighting, night signs, traffic control, &c.

The exhibit of the BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION, which is staged in the board room on the ground floor of the Old Torbay Hospital, illustrates, by actual examples where possible, the various "Services to Members" which the Association is able to render. The principal items consist of kinematograph-film displays; E.D.A. literature; examples of layouts and copy for electricity supply local advertising; window displays, including an entirely new one which the Association hopes to produce in the coming autumn; an exhibition of posters; and a collection of reports dealing with special subjects which have been prepared by E.D.A. sub-committees, *e.g.*, industrial electric heating, electric furnaces, rivet heating by electricity, electrical refrigeration, rural applications, and hire and hire-purchase and deferred-payment schemes. The remainder of the exhibit consists of a complete report of, and examples of material used in, national electrical development campaigns which have been conducted by the Association. A special handbook, "E.D.A. Service to Members," is available at the stand.

The BRITISH ELECTRIC TRANSFORMER CO., LTD., has on show a new "Tricity" table-type cooker suitable for 12 persons, and embodying the latest ideas. This exhibit also includes a kitchen kettle, recently patented, embodying a double automatic safety device. It is believed that this kettle is the first of its kind, inasmuch that protection is ensured against boiling dry, in addition to switching off whenever the kettle is lifted up. Cookers in alternative vitreously-enamelled and black and nickel finishes are also shown fitted with enclosed and open boiling plates. In the "Sunray" parlour on this stand is a new model "Sunray" lamp which incorporates hot-wire bars with the "Sunray" principle, in addition to standard "Sunray" designs.

Some interesting items of electro-medical apparatus for use in the home are to be seen on the stand of BRITISH QUAIN SUNLIGHT, LTD. The B.Q. sunlight bath is a soundly-constructed and well-insulated apparatus for tonic treatment at home, without medical supervision. It is claimed that the radiation from this apparatus is practically identical with Alpine sunlight. One outstanding feature of the bath is that when not in use as such, it makes a highly-efficient electric

Fig. 1.—The "B.Q." Ozoniser.

fire. It is supplied for all voltages to work off lighting or power supplies on either a.c. or d.c. A nickel-plated telescopic stand may be supplied with this model. The B.Q. "Ideal" sunbath lamp is a twin-arc model mounted on a telescopic stand giving a 20-A radiation at half this current. The model works equally satisfactorily from either a.c. or d.c., and is particularly recommended for nursing homes, clinics, &c., and for home treatment under medical supervision. The balancing resistance which is connected to the reflector may be used separately as an electric fire. The B.Q. ozoniser (fig. 1) represents, it is claimed, a distinct advance in providing an inexpensive easily-controlled apparatus for purifying, deodorising and revitalising the air in such places as crowded offices, theatres, shops, kitchens, &c. This apparatus is arranged for use with any fan or in any convenient place where there is a current of air. When switched on it immediately emits pure ozone in quantities which are regulated by the control knob, and which vary from the merest trace to the maximum output which is sufficient to completely purify and refreshen the air in an ordinary sized room in five minutes. It works with equal efficiency on a.c. or d.c., and has a loading of about 40 watts. The B.Q. electric fan is supplied primarily for use with the ozoniser.

A special exhibit by BURNLEY COMPONENTS, LTD., is a boiler fitted with a "Burco" automatic safety cut-out, which opens the circuit immediately the boiler is run dry. The cut-out is of robust design, and the switch contacts are large enough, it is claimed, to cope with 20 A at 250 volts, without burning the contacts. The cut-out is clamped to the pan bottom. Two parallel contact fingers close a circuit between two pairs of contact pillars, and the cable and element connections are completed to the contacts. The contact is maintained against the pressure of a coil spring by means of a stud, which is made in two portions soldered together. When the pan of the boiler has boiled dry, the solder melts, thus allowing the stem of the stud to telescope into the head, the coil spring forcing the contacts apart. The switch can be reset by inserting a new fuse plug or resoldering the used one in a few seconds. The user can easily renew the fuse plug from the inside of the boiler. A "Burco" combination boiler, another item on this stand, is specially designed for sterilising or for heating milk for cafés, &c. The liquid container is fitted inside the water container, which is heated by elements. The heat is applied through the boiling water, and milk may be raised to a temperature of 180 deg. F. by this means.

Another "Burco" exhibit is a special boiler which may be used for soup boiling or fat rendering. This has an outer casing of porcelain enamel, and the pan is of velvet-blued steel welded at all seams.

CARRON COMPANY is showing for the first time two new models of electric cookers. The "M" type cooker has an

Fig. 2.—A New "Carron" Cooker.

oven constructed on the one-piece, completely-removable principle, heated by means of side and bottom elements, while the "P" type cooker incorporates an oven heated by elements disposed at the top and bottom of the oven. We understand that these two cookers are to be the forerunners of a whole series of cookers of larger and smaller dimensions. A very attractive cooker on this stand is a medium-sized top- and bottom-heated cooker which is finished in a pleasing colour scheme of pale-green and cream. A similar model is finished in mottled grey-blue enamel, which is also a new departure for this company. These cookers, fig. 2, bear a strong resemblance to the old No. 310 Carron cooker, but a close examination of the new type reveals many improvements in design and manufacture. One of the side- and bottom-heated cookers is a "de luxe" model in mottled-grey enamel finish, and another is a standard-finish cooker with certain parts, including the hob, feet and baseplate, in mottled-grey enamel, the remainder being stove black enamel. A number of original features and improvements are incorporated in this design, including a side-hinged hob to allow access to the under hob assembly and connections when the cooker is situated in a confined space. There are also on this stand selections of the fires and irons manufactured by the company.

On the stand of CREDENDA CONDUITS CO., LTD., are examples of the latest models of "Creda" electric cookers. Various detail improvements have been incor-

porated since these were shown at the Convention last year at Bath, chief amongst which are improvements in the wiring arrangement for the boiling plates, and an improved type of grill pan. Oven-temperature indicators are now fitted which are easier to read, it is claimed, than the ordinary mercury oven thermometers. Samples are also exhibited of two new "Creda" wash boilers, C23 and C24, which have been designed to meet the needs for cheap and

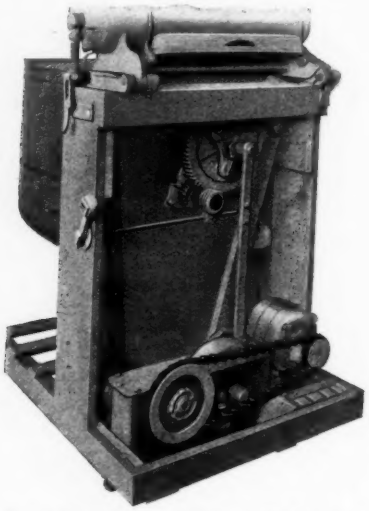


Fig. 3.—Driving Mechanism of "Ewbank" Washer.

efficient appliances of this nature, and the exhibit is completed with samples of the latest types of "Creda" automatic water-storage heaters and "Credalux" street-lighting fittings.

Some of the specialities of the DOWSING RADIANT HEAT CO., LTD., which are being shown are the "Wireless" (*i.e.*, cordless) electric ironing system, including the latest types of irons produced for use with it, the latest pattern of "Solarium" luminous ray bath, and a new form of protective device for water vessels, such as sterilisers. The last-mentioned apparatus is the subject of a provisional patent, No. 7361/29.

The following are among the exhibits of Messrs. DRAKE AND GORHAM WHOLESALE, LTD. A 1¼-gal. and a 4½- to 55-gal. "Inventum" hot-water cisterns. The former is of the push-through type, and the latter of the gravity-feed type, as approved by water-supply authorities. The new "Inventum" barber's cistern is fitted with a new mixing tap giving a very wide range of temperature control. A new bedwarmer is of the accumulator pattern and heavily nickel-plated. There is no solder incorporated in this bedwarmer, the whole job being of pressed metal. The bedwarmer is claimed to be absolutely fool-proof, as it cannot be placed in the bed with the current on. A new bathroom heater has white-enamelled adjustable brackets for wall or ceiling mounting, and is equipped with a "pull cord" pattern switch. Working on this stand is a model of a relay system operated by the Parmotor thermo-switch, with one pilot wire from a supply point for remote control. This model is designed to show control of street lighting on one side of the relay, and night-tariff water heaters on the other, both definitely under the control of the supply authority.

A new electric cooking plate shown on this stand is of very simple construction. Other Drake & Gorham exhibits include "foster mothers" for chickens, an e.h.p. ring-main controller (fully interlocked and mistake-proof) a "Metesco" e.h.p. oil switch-fuse, and a selection of "Inventum" fires. The fires are fitted with chromium-plated reflectors, which are practically untarnishable.

Among the items shown by ELECTRIC FIRES, LTD., is a 5-gal. thermal-storage water heater mounted on a framework and complete with a ball-valve tank, a basin for the draw-off water and sump, and a pump for the return of water to the high level, the whole being a portable and self contained unit for demonstration purposes. A 2-gal. thermal-storage water heater is arranged on a trunnion for easy inspection by visitors of all the working parts. A 10-gal. open-type ball-valve tank with low loading is also being shown, as is a 10-gal. combined hot-water tank and ball-valve chamber, all contained in one outer casing. Another interesting "Heatrae" exhibit is a small tank suitable for direct connection to the water supply and for the delivery of hot water to one point only. A few samples of Heatrae electric fires on this stand were chosen to demonstrate the three standard types of fire bars used by the firm to suit varying conditions. A small combined cooker-radiator is also included. Other Heatrae exhibits include hot pipes, towel rails, warming plates, a wash boiler, whistling kettles, low-temperature radiators, immersion heaters, and oil heaters.

The Lighting Service Bureau of the ELECTRIC LAMP MANUFACTURERS' ASSOCIATION OF GREAT BRITAIN, LTD., is this year responsible for three exhibits at the Convention. The first exhibit consists of a series of display panels illustrating lighting effects for use in electricity showroom windows. These panels are executed in a distinctly modern style, while the model interiors preserve a fascinating realism by virtue of the exactness of their detail. The following are the fields of lighting covered by the display: Two panels arranged to feature modern lamps, two panels demonstrating shop lighting, two panels illustrating home lighting, one panel demonstrating school lighting, and one panel depicting industrial lighting. It is the intention of the Bureau to loan these panels free of charge in sets of four to supply authorities for periods of two or three weeks. One part of the above exhibit is on view in the exhibition hall, and another section in the Torquay Electricity Department Showroom. The second display consists of a luminous sign situated on the front of the exhibition building, reading "I.M.E.A. Exhibition." This sign has been specially built with a new form of letter which has great possibilities for shop-facia purposes and for all short-range sign-lighting work.

The third lighting display consists of the special lighting features in the room on the ground floor of the exhibition, in which the display panels previously mentioned are exhibited. This room is lighted by a large central fitting of very modern construction, conforming to the latest standards of architectural lighting, while supplementary lighting novelty is provided by the two luminous columns which are installed at each side of the entrance doorway. Other interesting lighting features in this room are a lighted ornament display panel and a glareless lamp-display cabinet.

The Electrical Association for Women has displayed in an attractive manner the Association journal, "*The Electrical Age for Women*," and various leaflets which are distributed by the organisation.

ELECTROLUX, LTD., are showing various products, including the cleaner, refrigerator and floor polisher.

The "Ewbank" electric washer, which has recently been introduced by Messrs. ENTWISTLE & KENYON, LTD., is the main feature of this company's exhibit. The machine is an all-British production. Some of the claims put forward for this machine are: the rollers are unusually large, and are made of guaranteed quality rubber, 2 in. in diameter and 16 in. long. Risk of injury is claimed to be removed by the adoption of a spring-assisted release to the wringer control, which allows the rollers to be under the operator's absolute and instant command. Risk of damage to user, machine, or motor is reduced to a minimum by the fitting of automatic friction drive to the clothes container and wringer rollers. This feature overcomes the common trouble of premature failure of the motor, owing to its being burnt out through overload. The driving mechanism, fig. 3, and motor are under lock and key, being entirely encased away from water or dirt, while the chamber is so arranged that every part is of easy access. The gear box of special design allows the strong drive to run in oil, thereby relieving the user of the troublesome task of continually using an oil can. When not in use the machine can be folded into a useful kitchen table. The consumption of the machine is one unit in four hours.

On the stand of FERRANTI, LTD., are to be seen electric thermal-storage water-heating equipment, thermostats, load-levelling relays, and accessory control equipment. A small-

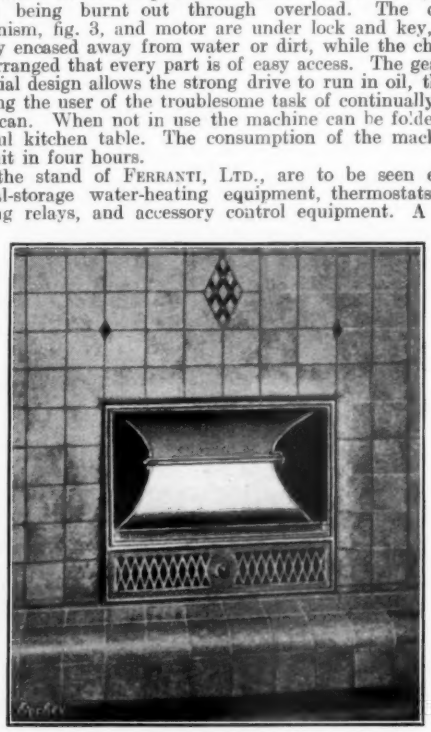


Fig. 4.—A New "Ferranti" Fire.

scale working model of a household water-heating installation is also a feature of this display, and the company is also showing a new range of "Ferranti" parabolic reflecting fires of improved design. Fig. 4 shows one of these fires. The outstanding feature is probably the large parabolic trough, which has, it is claimed, its angles of radiation definitely fixed according to the results of experiment. The reflecting surface is very highly polished, and the polish is rendered

permanent by a special process of plating with a heavy deposit of chromium. The heating element is of the "Globar" type. The fires have 2-heat control and the loading is 2¼ kW.

The latest addition to the range of "Met-Vick" products is an electric iron "de luxe," fig. 5, which is a feature of the display by METRO-VICK SUPPLIES. This iron is available in either nickel-plate or blue vitreous-enamel. A pressed-steel table stand is supplied with the iron. The rating is 550 watts, and the weight 5¼ lb. An improvement has been effected in the method of securing the flexible to the connector. A special cable clamp is fitted, which takes, it is claimed, all the pull off the actual connection, and the risk of breakage of the flexible at this point is entirely eliminated. This iron can also be supplied fitted with a new-type earthing connector and 3-core asbestos-braided flexible. The recently-introduced "Met-Vick" self-regulating kettle and the automatic kettle, both of which have already been described in detail, are also being shown. Demonstrations are also being given with the gyratory washing machine and the "Met-Vick" model "A" wash boiler. Storage water heaters and various types of immersion heaters are also included in the exhibit. The new "Met-Vick" bakelite lampholders and ceiling roses recently placed on the market are worthy of inspection, and samples of these accessories are available for testing purposes. The ceiling roses are provided with fixing holes of 2-in. centres, suitable for B.E.S.A. conduit boxes. By cutting away small portions of the rims, which are notched for that purpose, the roses can be used for surface-wiring systems. Pillar-type terminals of adequate size are provided for looping in, and the M.-V. patent cord-grip is embodied which, it is claimed, will support 56 lb. The lamp holders incorporate special cord-grip for all types of flexibles, special microme-alloy non-rusting springs, and the M.-V. patent solid plungers. For the illumination of the stand several fittings of modern designs have been installed. These include panel-type electroliers and brackets fitted with Gilbert-Riley glass-

Fig. 5.—The "Met-Vick" Electric Iron "de Luxe."

ware. The new model "B" Savage health motor is also being demonstrated.

The Horseferry Road Sub-station.

Some notes on synchronisation and good time-keeping, together with details of recently installed metal-clad high-voltage switchgear.

IN November, 1895, when Ferranti's bold introduction of alternating current had proved it to be the most economical method of generating and distributing electricity in bulk, Mr. F. Hope-Jones forecast, in an electrical journal then known as *Lightning*, the electric clock of the future as one driven by a small continuously-running synchronous motor, geared down to make a mantelshelf clock and plugged into the consumer's a.c. supply circuit.

That is exactly what the Warren synchronous motor has achieved: it is self-starting under load, it reaches a synchronous speed in a second or two, it measures only 2½ inches square, and it consumes about 4 watts, or less, at 110 volts and a periodicity of 50 cycles per second, thus consuming only 3 or 4 units per annum.

Its construction will be recalled from published descriptions.*

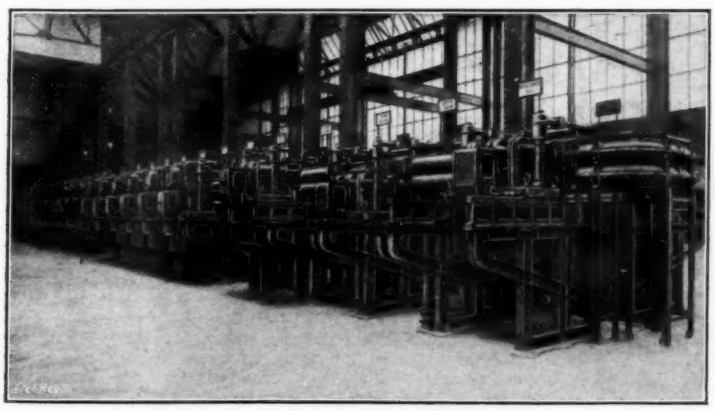


Fig. 1.—Metal-clad 22,000-volt Switchboard at Horseferry Road Sub-station, 30 sets.

An electro-magnet with its winding is provided with copper shading rings, which produce a rotating field; an iron armature is situated within the field and rotates in absolute synchronism with the frequency of the supply, owing to hysteretic drag. The spindle carrying the disk is geared down so that the main spindle revolves either once a minute, or once a second, as desired. All the moving parts are enclosed in a dust-tight housing containing oil in which the working parts are immersed.

Correspondents in the United States tell us that successful efforts are being made to keep the average frequency of their alternators in generating stations at a constant speed. For the purpose, the Warren Company supplies a good Graham dead-beat clock with a seconds pendulum as a master in each generating station, and provides a seconds hand concentric with a "Telechron" seconds hand, so that any lag, or advance, is revealed at once.

The linking-up of generating stations in Britain under the control of the Central Electricity Board will demand something better, and it is satisfactory to know that the London Power Co., Ltd., is combining the use of "Telechron" synchronous motors with the "Synchronome" system of electric clocks, which will give the various station engineers in the London area exceptional facilities for keeping their alternators in synchronism, not only at any given moment, but also true to time over a long period. In order to secure the correct speeding of the main alternators and synchronous phase operation of sub-stations, a Warren master frequency meter† has been installed in the Company's Horseferry Road station by Messrs. Everett, Edgcumbe & Co., Ltd., with whom the Synchronome Co., Ltd., collaborated in substituting its system in the various control stations, instead of ordinary clocks.

There is a great future before this method of wholesale distribution of uniform and fairly accurate time; how great and how soon it will arrive it is not easy to forecast; all we can say at present is that its star is in the ascendant. The tide of engineering development in the generation and distribution of light and power electrically has definitely turned in its favour. The use of alternating current is on the increase, and the linking-up of stations implies standardisation of periodicity, which demands accurate phase synchronisation, and that in turn demands good time-keeping.

The Horseferry Road sub-station is at present the main distribution switching centre of the London Power Company's interconnected system, and at that point five of the power stations and important distributing stations in the 22,000-volt system are linked together. Power will be supplied

* ELEC. REV., February 18th, 1927, p. 277.

† ELEC. REV., January 20th, 1928, p. 127.

through the switchboard from the Deptford generating station and eventually also from the Battersea station, at present under construction, and feeders radiate therefrom to the St. Martin's Lane, Shorts Gardens, Amberley Road, and Pelham Street distributing stations, as well as to the rotary convertors and transforming plant situated in the Westminster Electric Supply Corporation's sub-station on the same premises. If not the biggest, it is one of the largest installations of its kind in this country.

The main board consists of 30 metal-clad Metropolitan-Vickers switches, fig. 1, fitted with duplicate busbars and oil circuit breakers having a short-circuit rupturing capacity of 500,000 kVA. The space available was insufficient to accommodate the board in one length, and it has therefore been erected in two sections, fig. 2, arranged back-to-back with a passage-way between them to allow access to the cable boxes. The larger section of the board contains 22 units, and the smaller section 8 units, with space for extensions as and when required; the busbar chambers on the two sections are interconnected. The original installation consisted of ten units

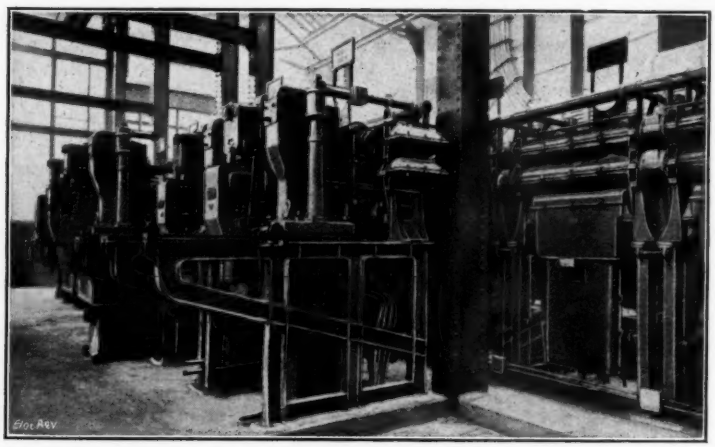


Fig. 2.—Back-to-back Arrangement of Switches.

only, and they were fitted with removable isolating plugs for effecting the change from one busbar to the other. The extension equipment was applied at a later period and included certain refinements of design and additional features to facilitate operation. In this case, selection of the busbars is made by a 3-pole oil-immersed selector situated in the hood of the circuit breaker and operated by a hand-wheel from the front. The selector switch is of the break-before-make type, and an interlock prevents the operation of the selector switch until the oil circuit breaker is in the open position.

The general design of the gear is similar to that of standard metal-clad equipment operated on the horizontal draw-out principle, with all the necessary interlocks. On the feeders which supply the Horseferry Road system special metering equipment is installed in duplicate. It consists of two special withdrawable carriages containing the current and voltage transformers necessary for operating Thomas pattern averaging recorders for metering purposes. Both sections of busbars are divided by bus-section units, and provision has been made for the addition of two further units that will control reactor equipment which, when it is installed, can be connected in either busbar as and when required. The busbars can also be coupled together by a switch when necessary.

All the type "K" oil circuit breakers are arranged for remote electrical operation from a vertical control board, which carries the usual instruments and relays and is surmounted by a mimic diagram on which the positions of the circuit breakers are indicated automatically by semaphores and indicating lamps. A special feature is that a white lamp on each panel shows to the operator whether the trip circuit is in good order or not, and the lighting-up of a green lamp indicates that the corresponding circuit breaker has been tripped automatically by the action of the protective gear; when this occurs a Klaxon horn gives audible warning to the operator and continues to do so until the control switch of the operated circuit breaker has been placed in the "off" position. All instruments are operated on the induction principle, and the system of protection adopted depends upon the circuit controlled and ranges from overload and leakage relays to a balanced voltage Merz-Beard equipment on the outgoing feeders.

Electric Steel Works in France.

La Société d'Etudes et de Construction Métallurgique, of Paris, has secured a contract for the equipment of the new electric steel works which are being established in Lorraine by the Société Minière et Métallurgique. At first two furnaces, one of 20 tons and one of 10 tons, are to be installed.

Legal.

Torquay Corporation Fined.

THE Mayor, Corporation and burgesses of Torquay were the defendants in a case heard by the Torquay magistrates on May 27th, being summoned for failing to cover a high-pressure cable with insulating material, in consequence of which neglect Nicholas G. Perring was killed on April 4th last. A second summons charged them with failing to so insulate the cable to prevent danger as was reasonably practicable. The Corporation entered a plea of "Not guilty."

Mr. B. G. SAYWELL, a solicitor in the department of the Director of Public Prosecutions, said that the proceedings were instituted under the Factory and Workshop Act, sections of which applied to trades certified to be dangerous. Any breach of the regulations contained in the Act was punishable by a fine of £10, and if a person were killed in consequence of such a breach there was liability to a penalty of £100, part or whole of which might be passed on to the deceased person's family. The offence in this particular case took place at a sub-station in the Torbay Road, which would come under the definition of a factory. There was a regulation which laid down that all cables in such places should be covered with insulating material, or so placed and safeguarded as to prevent danger, so far as was reasonably practicable. The sub-station was equipped with transformers, h. and l.p. switch-fuses and cable boxes. On April 4th Charles Edmonds, an electrician employed by the Corporation, accompanied by Perring, entered the sub-station to wind a time switch. He heard a groan, and, turning round, saw Perring grasping one of the h.p. cables. He pulled Perring away by the coat, applied artificial respiration, and sent for medical assistance, but Perring died. The piece of cable was cut, and had since been subjected to a test. It appeared that a joint had been made in it, the ends having been fixed together with a brass ferrule. This joint had been covered with a few layers of empire tape. It appeared that the joint was made about eight years ago, when the equipment was installed in the sub-station. In 1924 an inspector visited Torquay and called attention to the treatment of conductors, and also to the manner in which the sheathing was done. Ten different instances in various parts of the system were particularly referred to. The inspector visited the sub-station again in 1928, and the Corporation's attention was again called to the need for satisfactory protection of the h.p. cable, but apparently nothing was done at that particular sub-station.

Evidence in support of the summonses was then called. CHARLES EDMONDS described what happened at the sub-station on April 4th. Replying to Mr. P. H. W. Almy, solicitor for the defence, witness said that only authorised persons were allowed to enter sub-stations, and they had to take a mate with them. Perring was aware of the dangers of the stations. Mr. KENNETH PRESTON, divisional electrical inspector, stated that he had the piece of cable cut away, and on examination found a joint made by a brass ferrule, which had been covered with a few layers of empire tape. Such a cable should be out of reach or sheathed in lead. Vulcanised rubber covering was dangerous. He had tests made with the cable, and it was found that the insulation broke down at the joint at 900 V. In September, 1924, and again in April, 1928, he wrote to the Torquay electrical engineer calling attention to the need for sufficiently protecting h.p. cables. Cross-examined, Mr. Preston said that he did not agree that where only skilled and authorised men entered, such a high standard of protection was not needed as in places where the general public entered. As a matter of fact it was skilled persons who most frequently met with accidents. He did not think that the work prescribed by his letter of July, 1928, to the electrical engineer had been carried out.

Opening the case for the defence, Mr. ALMY submitted that the regulations imposed by the Act were in excess of what was practicable. This particular cable was covered with insulating material, but the man who put in the brass ferrule in order to prevent an unsightly bulge did not make the insulating material as thick as he should have done. The sub-station was a very tiny one, and a very dangerous place, and no one was allowed there without special authority. It was impossible for anyone to say exactly how Perring met his death, and it was certainly not due to the Corporation's neglect. So far as the inspector's letter of September, 1924, was concerned, the whole of the points in it were dealt with.

Mr. H. F. G. WOODS, borough electrical engineer, produced for the inspection of the magistrates the time sheets of the men who were employed in carrying out alterations at the sub-station in accordance with the suggestions of the divisional electrical inspector. What was then regarded as up-to-date gear was installed, but to-day it would not be so regarded. A fortnight before this accident occurred they were asked to install lead-sheathed cables. Mr. Woods declared that

modern practice was in advance of Home Office regulations. Witness pointed out that Perring had no key to the sub-station, and could only go there with an authorised expert, and that, to all appearances, the piece of cable was perfectly safe.

The magistrates found the case proved, and fined the Corporation £100 and ten guineas costs.

Correspondence.

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession.

Resonance Control.

I shall be glad to know whether any manufacturer in this country is prepared to offer apparatus suitable for what is known as "resonance control." The system is used for the control of power lines during a peak period, and is operated by super-imposing a higher or lower frequency on the line in order to operate relays which, in turn, cut out switches which control water heaters and other domestic apparatus. I believe that similar systems have been in effective operation both on the Continent and in America for some time past, but so far have not seen any reference to British apparatus. The period of control is determined by the station operator, and need not exceed five- or ten-minute intervals for any given line.

Any information on this subject will be highly appreciated by

Resonance.

June 3rd, 1929.

The Compulsory Earthing of Prepayment Meters.

With reference to the letter under the above heading in our issue of May 31st, page 992, signed by "W. Overs, foreman, Crompton Parkinson, Ltd.," the company informs us that it does not employ anyone of that name, and disclaims responsibility for the statements in the letter. Unless someone can really answer the original question, this correspondence must now close.—EDS. ELEC. REV.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1927.

30,222. "Headlights for motor-cars and other vehicles." F. H. Bluemel, H. E. R. Thomas and Bluemel Bros., Ltd. November 16th, 1927. (311,350.)

30,444. "Loud speakers and associated filter circuits." H. Green and Celebritone, Ltd. November 12th, 1927. (311,430.)

32,861. "Piezo-electric quartz resonator or oscillator." Radiofrequenz Ges. and H. Eberhard. December 4th, 1926. (281,728.)

33,959. "Tubular electric lamps." E. Pye and S. J. Heale. October 15th, 1928. (311,065.)

1928.

747. "Voltage-regulating means." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). January 9th, 1928. (311,351.)

813. "Process and apparatus for effecting chemical reactions in gases by means of electrical discharges." P. H. Hull and Imperial Chemical Industries, Ltd. January 10th, 1928. (311,352.)

2,895. "Drumstick fastening for suspension insulators." F. Berg. January 30th, 1928. (311,199.)

3,228. "Thermionic valve circuits." Siemens & Halske Akt. Ges. February 5th, 1927. (Addition to 279,452.) (284,706.)

3,311. "Electric switchgear." Allis-Chalmers Manufacturing Co. March 24th, 1927. (287,544.)

3,360. "Power generation and transmission systems." English Electric Co., Ltd., and C. J. Caldbeck. February 2nd, 1928. (311,201.)

3,674. "Electrolytic production of sterilising agents, germicides, and the like, and processes of applying such agents." United Water Softeners, Ltd., and E. B. Higgins. February 6th, 1928. (Cognate application 35,345/28.) (311,253.)

3,727. "Electric rectifiers." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabricken). February 6th, 1928. (311,254.)

3,733. "Electrical accumulators." W. Haddon and J. M. Burnett. February 6th, 1928. (Cognate applications 3,734/28, 3,735/28 and 3,736/28.) (311,303.)

3,747. "Wireless receiving apparatus." F. Oliver. February 7th, 1928. (311,356.)

3,764. "Variable condensers." W. Rogers and Wingrove & Rogers, Ltd. February 7th, 1928. (311,209.)

3,798. "Apparatus for charging and discharging electric storage batteries." H. C. Hodges. February 7th, 1928. (311,214.)

3,878. "Charging stations for storage batterics." Siemens-Schuckertwerke Akt. Ges. February 25th, 1927. (285,301.)

4,021. "Electrical control switchboards." W. A. Coates and Associated Electrical Industries, Ltd. February 8th, 1928. (311,262.)

4,023. "Electric reproduction of sound." L. G. H. Cantle. February 8th, 1928. (311,305.)

4,046. "Apparatus for indicating electrically the value of a quantity at a remote point." General Electric Co., Ltd., and C. C. Garrard. February 9th, 1928. (311,307.)

4,145 "Train-control systems." Associated Telephone & Telegraph Co., and A. E. Hudd. February 9th, 1928. (311,309.)

4,169. "Adjustment devices suitable for use with variable electric condensers." Soc. Belge Radio-Electrique. February 9th, 1927. (285,048.)

4,238. "Arrangements for generating a progressive movement of a body susceptible of being subjected to the influence of electromagnetic fields." M. Surjaninoff. February 11th, 1927. (285,089.)

4,362. "Electrical control systems for elevators, hoists, and the like." Associated Electric Industries, Ltd. (Westinghouse Electric & Manufacturing Co.). February 11th, 1928. (311,445.)

4,366. "Acoustic devices such as loud-speakers." Electrical Research Products, Inc. May 11th, 1927. (Addition to 290,235.) (290,239.)

4,388. "Aerial systems." C. S. Franklin. February 11th, 1928. (311,449.)

4,389. "Employment of wireless apparatus." S. Richardson. February 11th, 1928. (311,450.)

4,392. "High-frequency signalling over wires." Standard Telephones and Cables, Ltd. (Western Electric Co., Inc.). February 11th, 1928. (311,451.)

4,398. "Electric couplings, terminals, and the like." C. R. Cook. February 11th, 1928. (311,452.)

4,547. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., W. H. Paulett and C. Gillings. February 13th, 1928. (311,460.)

4,553. "Diaphragm for sound reproduction." H. Sachs and K. Locke. February 13th, 1928. (311,461.)

4,848. "Electromagnetic brakes." W. L. Spence. February 16th, 1928. (311,464.)

4,948. "Audio-frequency thermionic amplifiers." W. S. Smith and N. W. McLachlan. February 16th, 1928. (311,466.)

5,026. "Electric relays and like electroresponsive devices for use, for example, in electric protective systems." British Thomson-Houston Co., Ltd., and W. H. Lawes. February 17th, 1928. (311,469.)

5,318. "Electromagnetic drive units for loud-speakers and the like." G. W. Parr. February 20th, 1928. (311,476.)

6,045. "Wireless receiving apparatus." N. Bonavia-Hunt. February 27th, 1928. (311,485.)

6,052. "Electromagnetic acoustic devices for the interconversion of mechanical and electric oscillations, such as loud-speakers." British Thomson-Houston Co., Ltd., and R. D. Parry. February 27th, 1928. (311,486.)

6,117. "Manufacture of magnet cores for Pupin coils and the like." Felten and Guilleaume Carlswerk Akt. Ges. February 26th, 1927. (286,202.)

6,260. "Illuminated advertising devices." K. Rabes. October 22nd, 1927. (299,297.)

7,915. "Electric motor-driven centrifugal pumping units." Drysdale and Co., Ltd., and W. Drysdale. March 15th, 1928. (311,502.)

8,881. "Systems for producing high-frequency electric oscillations." British Thomson-Houston Co., Ltd. March 30th, 1927. (287,927.)

10,231. "Temperature compensators for use in magnetic measuring instruments." A. C. Spark Plug Co. April 8th, 1927. (288,313.)

10,811. "Wireless receiving apparatus of the crystal type." E. H. Sumner. April 12th, 1928. (311,524.)

10,965. "Wireless receiving apparatus." H. P. Hinton and Associated Electric Industries, Ltd. April 13th, 1928. (311,526.)

11,340. "Electric switches." Edison Swan Electric Co., Ltd., and F. Shergold. April 17th, 1928. (311,528.)

14,391. "Electric relays and contact-makers." H. R. G. Moore and L. C. B. Johnson. May 16th, 1928. (311,558.)

15,503. "Electrical ignition system for internal-combustion engines." R. Bosch Akt. Ges. July 14th, 1927. (293,851.)

15,969. "Electrically-heated dispensing pumps." W. H. Crawford. May 31st, 1928. (311,569.)

16,431. "Electric switches." G. Marr. June 6th, 1928. (311,572.)

16,712. "Mercury-vapour rectifier." Akt. Ges. Brown, Boveri et Cie. June 11th, 1927. (292,075.)

17,473. "Multi-lamp electric lighting apparatus." General Electric Co., Ltd., and E. L. Randall. June 16th, 1928. (311,579.)

18,501. "Manufacture of commutators." International General Electric Co., Inc. June 30th, 1927. (293,039.)

21,011. "Variable electric condensers." F. Pavlan January 21st, 1928. (304,583.)

22,074. "Electrical generating and distributing systems for internal-combustion engines." A. E. White (Indian Motocycle Co.). July 30th, 1928. (311,605.)

22,456. "Alternating-current induction motors." J. Gize. August 2nd, 1927. (294,966.)

23,305. "Sparking-plug for internal-combustion engines, and method of manufacturing the same." L. Bruzzone. August 13th, 1928. (311,611.)

23,699. "Headlamps of motor road vehicles." P. F. Howse. August 17th, 1928. (311,612.)

24,580. "Sparking plugs for internal-combustion engines." A. Coenders and C. Potz. August 27th, 1928. (311,617.)

30,001. "Means for reducing the eddy-current losses in the windings of alternating-current machines." International General Electric Co., Inc. (October 19th, 1927. (299,013.)

30,163. "Ignition testers for internal-combustion engines." Luderswerk Ges. and G. Slupinski. October 18th, 1928. (311,633.)

31,614. "Galleries for electric lamps." J. McLean. October 31st, 1928 (311,640.)

31,818. "Electric power systems for ship propulsion and other purposes." British Thomson-Houston Co., Ltd. November 1st, 1927. (299,812.)

32,671. "Aerial systems." Marconi's Wireless Telegraph Co., Ltd. November 8th, 1927. (300,211.)

35,613. "Electric discharge devices." British Thomson-Houston Co., Ltd December 2nd, 1927. (301,744.)

38,269. "Electric shuttle-operating devices for power looms." A. Jasicek and F. Polnauer. December 28th, 1927. (303,119.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from May 29th :—

Eldrive, Silence, Efficiency (lettering and design). No. 500,435. Class 6. Electric motors and parts thereof.—Electro-drives, Ltd., Curtis Buildings, Park Royal, N.W.10.

Varatio. No. 501,845. All goods in Class 6.—Variable Power Transmissions, Ltd., Britannia Works, Bassein Road, Shepherd's Bush, W.12.

Davco. No. 501,684. Class 8. Instruments and apparatus for use in radio-telegraphy and telephony.—Daventry & Co., Ltd., Mellings Yard, Friargate, Preston.

The Warrior (lettering and design). No. 501,032. All goods in Class 8.—J. Bridge & Sons, 31, West Warrior Square, Southend-on-Sea.

Embob. No. 497,468. Class 13. Electric irons, soldering irons, electric terminals, adaptors, switches, &c.—Maurice Bobin, 15, Farringdon Avenue, E.C.4.

MacKrolite. No. 500,290. Class 13. Lamps for motor vehicles.—Krolite, Ltd., Terminus Works, Gorgie, Edinburgh.

Visor. No. 500,152. Class 15. Reflectors, shades, globes and similar articles for use in connection with electric lighting, all being made of glass.—Benjamin Electric, Ltd., Tariff Road, Tottenham, N.17.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

AYR.—Workshop, for James Bowie & Co., Newmarket Street; the manager.

BARKING.—Factory, Creeksmouth; Coal Conversion, Ltd. Public health offices, Town Yard; Special U.D.C. Committee.

BEXHILL.—40 houses, Burnt House Farm; Gilbert Bros., Broadstairs. Schools; Church of England managers. Additions, British Legion Club, Station Road; J. H. Lye.

BEXLEY.—Houses (36), Broomfield Road; James and Norman. Development of Goldsmidt estate; Tuckett, Webster & Co.

BISHOP'S STORTFORD.—Nurses' home, for Board of Guardians; Elcock & Sutcliffe, architects, Northumberland Avenue, W.C.2.

BOGNOR.—Council buildings; C. Cowles Voysey, architect. Masonic hall (£5,000); J. Draper, architect.

BOURNEMOUTH.—Lecture hall, Malmesbury Park Road; Natural Science Society. Alterations, 719-735, Christchurch Road; W. S. White & Co.

BRACKLEY.—Re-erection of Cottisford Manor (mansion), for Mr. Bertram.

BROMLEY (KENT).—Additional 63 houses, for the T.C.; borough surveyor.

BUCKHURST (ESSEX).—Houses (54), Hurst Road estate, for Mr. Stokes.

BUCKLOW.—Housing scheme (34), Royle Green Road, Northenden, for R.D.C. (deposit £2 2s.); R. C. Cordon, engineer and surveyor, 24-26, Station Buildings, Altrincham.

CARSHALTON.—Houses (32), Banstead Road, for V. Shire.

CHELMSFORD.—Development, building estate near Sandford Road; R. P. Burgess, Braintree.

CHERTSEY.—R.C. church; Boy & Murley, Ltd., builders, Reading.

CROYDON.—Factory, Osborne Way; J. W. Hall. 33 garages, 6 workshops and bakery, Russell Hill Place; J. P. Oldacer.

DARENTH.—Workrooms, for training colony (£7,432); Frost and Sheehan, Ltd., Westminster, for M.A.B.

DIDCOT.—Senior school (250 places), for Berks. E.C. (£11,000); director of education, Reading.

EDINBURGH.—Cinema, for Provincial Cinematograph Theatres, Ltd. (£50,000); architects: W. E. Trent, London, and J. Jerdan, Edinburgh.

FALKIRK.—Cinema; John McKessack & Son, architects, West Regent Street, Glasgow.

GLASGOW.—Extensions, Parkhead 'bus depôt (£28,000); tramway manager.

GUILDFORD.—Conversion of Malthouse Tap into shops and flats, Portsmouth Road; H. E. Smith.

HEMSWORTH.—Infirmary block, for the Board of Guardians; clerk.

HERTFORD.—Re-erection of sawmill, Cole Green, for A. G. Mousley.

IRISH FREE STATE (DUBLIN).—Electric lighting installation at the Courthouse, Kilmainham, for County Council; J. P. Tierney & Co., consulting engineers, 44, Kildare Street.

JARROW.—Boys' central school (200 places); Roman Catholic rural dean.

KINGSTON-ON-THAMES. — Reconstruction of premises, Thames Street, for Wolfe & Hollander, Ltd., Tottenham Court Road, W.1.

KIPPEN (STIRLING).—Extensions, Dun Eaglais, for Sir D. Y. Cameron.

LEAVESDEN.—School, for St. Pancras Board of Guardians; Herts. Education Committee.

LIVERPOOL.—School of commerce, for E.C. (£28,240); Roberts & Sloss.

LONDON (POPLAR, E.).—Warehouse, High Street; W. J. Foster. Extensions, granary and laboratory, Alpha Road; J. Jarvis & Sons, Ltd. Buildings, Tredegar Works, Ordell Road; Wood Bros. Warehouse, 181, Bow Road; D. H. Klausner. Warehouse, 3-6, King Street; Commercial Structures, Ltd.

(HORNSEY, N.).—Alterations and additions, Summerland Cinema, Summerland Gardens; A. Ferriss.

(GREENWICH, S.E.).—Infant welfare centre, Shooters Hill Road (£3,150), for the T.C.; borough surveyor.

(CHARLTON, S.E.).—School (520 places) on Charlton Park housing estate, for L.C.C.

(HITHER GREEN, S.E.).—Nurses' home, Park Hospital (£31,500); Paine & Hobday, architects for M.A.B.

(WIMBLEDON, S.W.).—Town hall (£139,113); Galbraith Bros., Ltd., Camberwell, S.E. Reconstruction, shops and houses, 67, 67a, and 69, Ridgway; E. Iles.

(HAMMERSMITH, W.).—Library and child welfare centre, Wormholt estate, for B.C. (£10,670); A. E. Russel, contractor, Belgrave Works, Boundary Road, E.17.

LUMLEY.—School (216 places), for Durham E.C.; F. Willey, architect, 34, Old Elvet, Durham.

LUTON.—Town hall (£250,000), for T.C.

MANSFIELD.—Plaza Kinema; C. H. Hill, builder.

MERTHYR TYDFIL.—Extensions, General Hospital, including X-ray department, operating theatre, and nurses' quarters; Johnson, Richards & Rees, architects (returnable deposit of £10 10s.).

MIDDLESBROUGH.—Re-erection of warehouse, factory and workshops, for Dickson & Benson, Ltd. (£40,000 to £50,000).

NEW BARNET.—Elementary school, Cromer Road; Herts. Education Committee.

NEWCASTLE-ON-TYNE. — Rebuilding business premises, Northumberland Street, for Messrs. Chapman.

NEWPORT (ISLE OF WIGHT).—Reconstruction of Royal County Hospital (£15,000); John Seely, architect, London.

ROCHDALE.—Housing scheme (44), Rathbone Street; borough surveyor.

RYDE.—Reconstruction, Royal Isle of Wight County Hospital (£15,000); John Seely & Paul Paget, architects, 3, Queen's Square Place, Queen Anne's Gate, Westminster, S.W.1.

SCUNTHORPE.—Additions to secondary school, Doncaster Road, for Lindsey C.C. (deposit £2 2s.); Scorer, Gamble and Co., architects, Bank Street, Lincoln.

SLOUGH.—Houses (500), Farnham Road, for W. Gradwell and Co., Ltd.

SMETHWICK.—Extensions, Holly Lane Hospital; Roland Fletcher, borough engineer (returnable deposit of £2 2s.).

SUTTON (SURREY).—Houses (41), Green Lane, Worcester Park, for Messrs. Shuttleworth. Houses (22), Morden Way, for Braddy & Randall.

TADCASTER.—Extensions, Garforth Hospital (£9,500), for the R.D.C.; clerk.

TIVERTON.—Additional 29 houses, for the T.C.; borough surveyor.

TRANENT (EAST LOTHIAN).—Roman Catholic school (£20,000); priest-in-charge, St. Martin's.

WAKEFIELD.—Two shops and village hall at Middlestown, for Middlestown Co-operative Society; S. P. Fairhurst, architect, Eastthorpe House, Mirfield, Yorks.

WATFORD.—Auxiliary pumping station, waterworks, for the T.C.; W. W. Newman, borough engineer (returnable deposit of £2 2s.).

WELLINGBOROUGH.—Boys' secondary school for Northants E.C.; Talbot Brown & Fisher, architects, Burystead Place (returnable deposit of £2 2s.).

WESTON-SUPER-MARE.—Extensions, public library, for the U.D.C.; Fry, Paterson & Jones, architects, 28, Waterloo Street (returnable deposit of £2 2s.).

YORK.—Workshops, Dennison Street; Welding Engineers (York), Ltd. Additions, Clifton Dale; H. Colman and Sons, Ltd. Alterations, Fishergate; National Glass Co. Extensions, Parliament Street; Marks & Spencer, Ltd.